# LARIMER COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT

LARIMER COUNTY
HEALTH & ENVIRONMENT

Public Health

# On-Site Wastewater Treatment System Regulations





ADOPTED: 08/20/2026
EFFECTIVE: 10/04/2026

1525 Blue Spruce Drive, Fort Collins, Colorado 80524

## 43.1 Authority

This regulation is promulgated pursuant to the On-site Wastewater Treatment System Act, 25-10-101, et seq. C.R.S.

## 43.2 Scope and Purpose

A. Declaration

1. The Larimer County Board of Health declares the intent of these Regulations is to preserve the environment and protect the public health and water quality; to eliminate and control the causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land, and water; it is declared to be in the public interest to establish minimum standards, rules, and regulations for on-site wastewater treatment systems (OWTS) in the County of Larimer and to provide the authority for the administration and enforcement of such minimum standards, rules, and regulations. Further, the Board recognizes that some sites in Larimer County may be unsuitable for any type of OWTS and ownership of the property, or the fact that the site is part of a platted subdivision, shall not guarantee to any person that a sewage system application will be approved for the site.

2. This regulation will apply to On-site Wastewater Treatment Systems as defined in section 25-10-103(12), C.R.S.

B. Purpose

1. The purpose of this regulation as authorized by the OWTS Act is to establish minimum standards for the location, design, construction, performance, installation, alteration and use of OWTS within the state of Colorado, and establish the minimum requirements for regulations adopted by local boards of health including but not limited to permit application requirements; requirements for issuing permits; the inspection, testing, and supervision of installed systems; the maintenance and cleaning of systems; the disposal of waste material and the issuance of cease and desist orders.

C. Effluent Discharged to Surface Waters

1. Any system that will discharge into surface waters must be designed by a professional engineer. The discharge permit application must be submitted for preliminary approval to the local Board of Health. Once approved by the local Board of Health, the application must be submitted to the Water Quality Control Division for review in accordance with the Water Quality Control Act, 25-8-101, et seq .C.R.S, and all applicable regulations of the Water Quality Control Commission. Compliance with such a permit will be deemed full compliance with this regulation.

D. Jurisdiction of Local Health Agencies

1. The jurisdiction of any local health agency extends over all unincorporated areas and over all municipal corporations within the territorial limits of the county or the counties comprising the district public health agency, but not over the territory of any municipal corporation that maintains its own public health agency.

## 43.3 Definitions

1. "Absorption system" means a leaching field and adjacent soils or other system for the treatment of sewage in an On-site Wastewater Treatment System by means of absorption into the ground. See Soil treatment area.

2. “Accessible” means easily reached, attained or entered by the necessary equipment or maintenance provider.

3. “Alteration” (alter) means to change in character or composition of the OWTS. This includes any modification to the OWTS resulting in a small yet significant difference.

4. "Applicant" means a person who submits an application for a permit for an On-site Wastewater Treatment System.

5. “Auxiliary Building” means a non-residential structure, located on the same lot or parcel as the principal structure, and for an incidental use to the principal structure.

6. “Basal Area” means the effective surface area available to transmit the treated effluent from the filter media in a mound system into the in-situ receiving soils. The perimeter is measured at the interface of the imported fill material and in-situ soil. On sloping sites, only the area down-gradient from the up-slope edge of the distribution media may be included in this calculation.

7. "Bed" means a below-grade soil treatment area with a level sub-base, consisting of a shallow excavation greater than three feet wide containing distribution media and more than one lateral.

8. "Bedrock" means continuous rock that underlies the soil or is exposed at the surface. Bedrock is generally considered impervious, but if fractured or deteriorated, it may allow effluent to pass through without adequate treatment.

9. “Bedroom” means a room with an egress window and door, closet, and/or is intended for sleeping purposes.

10. "Biochemical Oxygen Demand, Five-Day" ($BOD_5$) means quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating biodegradable organic matter under aerobic conditions over a five-day incubation period; expressed in milligrams per liter (mg/L).

11. "Biochemical Oxygen Demand, Carbonaceous Five Day" ($CBOD_5$) means quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating the organic matter under aerobic conditions over a five-day incubation period while in the presence of a chemical inhibitor to block nitrification; expressed in milligrams per liter (mg/L).

12. “Board of Health” means the Board of Health appointed by the Board of County Commissioners of Larimer County, Colorado.

13. "Building sewer" means piping that conveys wastewater to the first system component or the sewer main.

14. "Carbonaceous Biochemical Oxygen Demand" See Biochemical Oxygen Demand, Carbonaceous.

15. "Cesspool" means an unlined or partially lined underground pit or underground perforated receptacle into which raw household wastewater is discharged and from which the liquid seeps into the surrounding soil. Cesspool does not include a septic tank.

16. "Chamber" means an open, arch-shaped structure providing an open-bottom soil interface with permeable sidewalls used for distribution of effluent in a soil absorption system.

17. “Cistern” means an underground, enclosed unpressurized reservoir or tank for storing water as part of a water well or potable water supply system.

18. "Cleaning" means the act of removing septage or other wastes from a wastewater treatment system component or grease/waste from a grease interceptor.

19. "Colorado Plumbing Code" means Rules and Regulations of the Colorado State Plumbing Board (3 CCR 720-1).

20. "Commission" means the Water Quality Control Commission created by section 25-8-201, C.R.S.

21. “Competent Technician” means a person working under the supervision of a Professional Engineer or Professional Geologist or an employee of the Department who has received training in soil and site evaluations per the requirements of section 43.5.I, and who is able to conduct and interpret the results of soil profile test pit excavations, percolation tests, and site evaluations.

22. "Component" means a subsection of an On-site Wastewater Treatment System; a component may include multiple devices.

23. 'Composting toilet" means a self-contained waterless toilet designed to decompose non-water-carried human wastes through microbial action and to store the resulting matter for disposal.

24. "Consistence" means the degree and kind of cohesion and adhesion that soil exhibits and/or the resistance of soil to deformation or rupture under an applied stress to an extent that the soil density would restrict permeability. Aspects of consistence are used to determine if the horizon will have permeability lower than that of the defined soil type. Additional insight to consistence can be found in the USDA-NRCS Field book for Describing and Sampling Soils; Version 3.0, Sept. 2012.

25. "Crest" means the highest point on the side of a dry gulch or cut bank.

26. “Cut-bank” means a nearly vertical slope caused by erosion or construction that has exposed historic soil strata.

27. "Deep gravel system" means a soil treatment area for repairs only where the trenches utilize a depth of gravel greater than 6 inches below the distribution pipe and sidewall area is allowed according to a formula specified in this regulation.

28. “Deficiency” See Malfunction.

29. “Department” means the Larimer County Department of Health and Environment.

30. "Design" means 1. the process of selecting, sizing, locating, specifying, and configuring treatment train components that match site characteristics and facility use as well as creating the associated written documentation; and 2. written documentation of size, location, specification and configuration of a system.

31. "Design capacity" See Flow, Design.

32. "Design flow" See Flow, Design.

33. "Designer, on-site wastewater treatment system" means a practitioner who utilizes site evaluation and investigation information to select an appropriate OWTS and prepares a design document in conformance with this regulation.

34. “Disinfection” means the process of destroying pathogenic microorganisms in sewage through the application of ultraviolet light, chlorination, or ozonation.

35. "Distribution" means the process of DISPENSING wastewater or effluent to one or more components, devices, or throughout a soil treatment area.

36. "Distribution box" means a watertight component that receives effluent from a septic tank or other treatment unit and distributes effluent via gravity in approximately equal portions to two or more distribution laterals in the soil treatment area.

37. "Division" means the division of administration of the Department of which the Water Quality Control Division is a part.

38. "Domestic wastewater" See Wastewater, domestic.

39. "Domestic Wastewater Treatment Works" means a system or facility for treating, neutralizing, stabilizing, or disposing of domestic wastewater which system or facility has a designed capacity to receive more than 2,000 gallons of domestic wastewater per day. The term "domestic wastewater treatment works" also includes appurtenances to such system or facility such as outfall sewers and pumping stations and to equipment related to such appurtenances. The term "domestic wastewater treatment works" does not include industrial wastewater treatment plants or complexes whose primary function is the treatment of industrial wastes, notwithstanding the fact that human wastes generated incidentally to the industrial process are treated therein. 25-8-103 (5), C.R.S.

40. "Dosing" means a high rate periodic discharge into a soil treatment area.

41. "Dosing, demand" means configuration in which a specific volume of effluent is delivered to a component based upon patterns of wastewater generation from the source.

42. "Dosing, pressure" means a uniform application of wastewater throughout the intended portion of the soil treatment area through small diameter pipes and orifices, under pressure. For this definition, the term pressure indicates that the system is capable of creating upward movement of effluent out of the distribution system piping.

43. "Dosing, timed" means a configuration in which a specific volume of effluent is delivered to a component based upon a prescribed interval, regardless of facility water use.

44. "Dosing siphon" means a device used for demand dosing effluent; which stores a predetermined volume of water and discharges it at a rapid rate, from a tank at a given elevation to a component at a lower elevation, accomplished by means of atmospheric pressure and the suction created by the weight of the liquid in the conveying pipe.

45. "Dosing tank" means a tank, compartment or basin that provides for storage of effluent from a septic tank or other treatment unit intended to be delivered to a soil treatment area at a high rate periodic discharge.

46. "Drainfield" See Soil treatment area.

47. "Drop box" means a device used for sequential distribution of effluent by gravity flow to a lateral of a soil treatment area.

48. "Dry gulch" See Gulch, dry.

49. "Drywell" means an unlined or partially lined underground pit (regardless of geometry) into which drainage from roofs, basement floors, water softeners or other non-wastewater sources is discharged and from which the liquid seeps into the surrounding soil.

50. "Effective Size" means the size of granular media such that 10 percent by weight of the media is finer than the size specified.

51. "Effluent" means the liquid flowing out of a component or device of an On-site Wastewater Treatment System.

52. “Effluent Filter” means a removable, cleanable (or disposable) device installed on the outlet piping of a septic tank for the purpose of retaining solids larger than one-eighth inch and/or modulating effluent flow rate. An effluent filter may be a component of a pump installation. An effluent filter may also be installed following the septic tank but before higher level treatment components or a soil treatment area.

53. "Effluent pipe" means non-perforated pipe that conveys effluent from one On-site Wastewater Treatment System component to the next.

54. "Environmental health specialist" means a person trained in physical, biological, or sanitary science to carry out educational and inspectional duties in the field of environmental health.

55. “Ephemeral stream” means a stream with discontinuous, storm influenced flows for a short duration in direct response to a precipitation event. These streams typically do not impact the groundwater table, have a poorly developed channel or streambed, and often have vegetation matching the surrounding area growing in the channel. See also “Gulch, Dry”.

56. "Evapotranspiration/absorption system" means an unlined On-site Wastewater Treatment component that uses evaporation, transpiration, and absorption for dispersal of effluent.

57. "Evapotranspiration system" means an On-site Wastewater Treatment component with a continuous, impermeable liner that uses evapotranspiration and transpiration for dispersal of effluent.

58. "Failure" means a condition existing within any component of an OWTS which prevents the system from functioning as intended, and which results in the discharge of untreated or partially treated wastewater onto the ground surface, into surface water or groundwater, or which results in the back-up of sewage into the building sewer. Other conditions within an OWTS component that are deemed by the Department to be a threat to public health and/or safety may also be deemed a failure.

59. "Field performance testing" means data gathering on a system in actual use that is being proposed for Division acceptance.

60. "Floodplain (100-year)" means an area adjacent to a stream which is subject to flooding as the result of the occurrence of a one hundred (100) year flood, and is so adverse to past, current or foreseeable construction or land use as to constitute a significant hazard to public or environmental health and safety or to property or is designated by the Federal Emergency Management Agency (FEMA) or National Flood Insurance Program (NFIP). In the absence of FEMA/NFIP maps, a professional engineer must certify the flood plain elevations.

61. "Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation
more than one foot or as designated by the Federal Emergency Management Agency or National Flood

Insurance Program. In the absence of FEMA/NFIP maps, a professional engineer must certify the floodway elevation and location.

62. "Flow, daily" means the measured volume of wastewater generated from a facility in a 24-hour period expressed as gallons per day.

63. "Flow, design" means the estimated volume of wastewater per unit of time for which a component or system is designed. Design flow may be given in the estimated volume per unit such as person per unit time that must be multiplied by the maximum number of units that a facility can accommodate over that time.

64. "Flow equalization" means a system configuration that includes sufficient effluent storage capacity to allow for regulated flow on a daily or multi-day basis to a subsequent component despite variable flow from the source.

65. "Flow equalizer" means an adjustment device to evenly distribute flow between outlets in a distribution box or other device that may be out of level.

66. "Grease interceptor tank" means a watertight device located outside a facility designed to intercept, congeal, and retain or remove fats, oils, and grease from sources such as commercial food-service that will generate high levels of fats, oils and greases.

67. "Ground water" means that part of the subsurface water that is at or below the saturated zone.

68. “Groundwater Condition” means a condition in the soil profile where a seasonal or current ground water surface has been identified, thus creating a vertical separation requirement to the infiltrative surface of a soil treatment area.

69. "Ground water surface" means the uppermost limit of an unconfined aquifer at atmospheric pressure.

70. "Guidelines" means State Board of Health Guidelines on Individual Sewage Disposal Systems, 5 CCR 1003-6 – predecessor of Regulation 43, On-site Wastewater Treatment System Regulation, 5 CCR 1002-43.

71. "Gulch, dry" means a deep, narrow ravine marking the course of an ephemeral stream.

72. "Health officer" means the chief administrative and executive officer of the Department, or the appointed health officer of the Board of Health. Health Officer includes the Director of the Department.

73. "Higher level treatment" means designated treatment levels other than treatment level 1. (See Table 6-3)

74. “Holding tank” See Vault.

75. "Individual Sewage Disposal System" means a term used for On-site Wastewater Treatment System in Colorado regulations from 1973 until 2013.

76. "Infiltrative surface" means designated interface where effluent moves from distribution media or a distribution product into treatment media or original soil. In standard trench or bed systems this will be the interface of the distribution media or product and in-situ soil. Two separate infiltrative surfaces will exist in a mound system and an unlined sand filter, one at the interface of the distribution media and fill sand, the other at the interface of the fill sand and in-situ soil.

77. "Inspection port" means an access point in a system component that enables inspection, operation and/or maintenance.

78. “Intermittent stream” means a stream that typically flows at least once per year, exhibits an elevated groundwater table and a defined channel and bed. An intermittent stream may have evidence of fluctuating high-water marks, such as sediment-stained leaves, blackened or decaying leaf litter, bare ground, or vegetation drift lines. An intermittent stream is treated as surface water in Table 7-1.

79. "Invert" means elevation of the bottom of the inside pipe wall or fitting.

80. “Lateral” means a pipe, chamber or other component used to transport and distribute effluent.

81. "Leach field" see Soil Treatment Area.

82. "Limiting Layer” means a horizon or condition in the soil profile that exhibits a limited capability for treatment, but will readily accept the effluent. Generally speaking, this includes fractured bedrock, and type r-0 soils (see table 10-1a)

83. "Liner" means an impermeable synthetic or natural material used to prevent or restrict infiltration and/or exfiltration. For the purposes of this regulation, the minimum thickness of a liner must be 30 ml.

84. “Linear loading rate” means the amount of effluent applied per linear foot along the contour (gpd/linear ft.).

85. "Local Board of Health" means any local, county, or district Board of Health.

86. "Local health Department" See Department.

87. "Local Public Health Agency" means any county, district, or municipal public health agency and may include a county, district, or municipal board of health to oversee onsite wastewater treatment system permitting and inspection or an on-site wastewater treatment system program. a local public health agency may designate another agency to administer the OWTS program.

88. "Long-term acceptance rate" (LTAR) means design parameter expressing the rate that effluent enters the infiltrative surface of the soil treatment area at equilibrium, measured in volume per area per time, e.g. gallons per square foot per day (gal/ $ft^2$/day).

89. "Malfunction" means the condition in which a component is not performing as designed or installed and is in need of repair or modification in order to function as originally intended.

90. "Manufactured media" See Media, other manufactured.

91. "Media" means solid material that can be described by shape, dimensions, surface area, void space, and application.

92. “Media, enhanced manufactured” means an accepted proprietary manufactured distribution product that includes synthetic media contained within one or more external permeable outer layers which promote the movement of the effluent, and is placed on a specified sand base or media that does not mask the infiltrative surface of the in-situ soil.

93. "Media, other manufactured" means an accepted proprietary manufactured distribution product made of synthetic media for distribution of effluent that is placed directly on the in-situ soil.

94. "Media, treatment" means non-or slowly-degradable media used for physical, chemical, and/or biological treatment in an On-site Wastewater Treatment System component.

95. "Mound" means a soil treatment area whereby the infiltrative surface must be placed at or above original grade to meet vertical separation requirements to a limiting layer.

96. "Nitrogen reduction" means a minimum 50 percent reduction of influent nitrogen strength which is the minimum objective of NSF/ANSI Standard 245 - Wastewater Treatment Systems - Nitrogen Reduction.

97. "On-Site Wastewater Treatment System" or "OWTS" and, where the context so indicates, the term "system" means an absorption system of any size or flow or a system or facility for treating, neutralizing, stabilizing, or dispersing sewage generated in the vicinity, which system is not a part of or connected to a sewage treatment works.

98. "OWTS Act" means the On-site Wastewater Treatment System Act, 25-10-101, et seq. C.R.S.

99. "Percolation test" means a subsurface soil test at the depth of a proposed absorptTransporten sandy soils containing five percent orion system or similar component of an OWTS to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed. The rate is expressed in minutes per inch.

100. "Performance standard" means minimum performance criteria for water quality and operation and maintenance established by the regulatory authority to ensure compliance with the public health and environmental goals of the state or public health agency.

101. "Permeability" means the property of a material which permits movement of water through the material.

102. "Permit" means a permit for the construction or alteration, installation, and use or for the repair of an On-site Wastewater Treatment System.

103. "Person" means an individual, partnership, firm, corporation, association, or other legal entity and also the state, any political subdivision thereof, or other governmental entity.

104. "Pressure distribution" See Dosing, pressure.

105. "Privy" means an above grade structure allowing for the disposal of excreta not transported by a sewer and which provides privacy and shelter and prevents access to the excreta by flies, rodents, or other vectors.

a. Pit privy – privy over an unlined excavation.

b. Vault privy – privy over a vault.

106. “Professional Engineer” means an engineer licensed in Colorado, in accordance with section 12-120-201, et. seq., c.r.s. and practicing within their areas of expertise, consistent with 4 ccr 730-1.

107. "Professional geologist" means a person who is a graduate of an institution of higher education which is accredited by a regional or national accrediting agency, with a minimum of thirty semester (forty-five quarter) hours of undergraduate or graduate work in a field of geology and whose post-baccalaureate training has been in the field of geology with a specific record of an additional five years of geological experience to include no more than two years of graduate work. 23-41-208, C.R.S. and 34-1-201, C.R.S.

108. "Proprietary product" means a manufactured component or other product that is produced by a private person. It may be protected by patent, trademark or copyright.

109. "Public domain technology" means a system that is assembled on location from readily available components and is based on well-established design criteria and is not protected by patent, trademark or copyright.

110. “Record drawing” means construction drawings provided to illustrate the progress or completion of the installation of an OWTS, or components of the OWTS; typically based on field inspections by the designer or Department.

111. "Redoximorphic" means a soil property that results from the reduction and oxidation of iron and manganese compounds in the soil after saturation with water and subsequent desaturation.

112. "Remediation system" means a treatment system, chemical/biological additive or physical process that is proposed to restore the soil treatment area of an OWTS to intended performance.

113. “Repair” means restoration of functionality and/or treatment by reconstruction, relocation, or replacement of an on-site wastewater treatment system or any component thereof in order to allow the system to function as intended.

114. “Replacement system” See Repair.

115. "Riser" means a watertight vertical cylinder and lid allowing access to an OWTS component for inspection, cleaning, maintenance, or sampling.

116. “Restrictive Layer” means a condition in the soil profile that restricts the vertical movement of the effluent. this may include impervious bedrock, glacial till, platy soils, sodic soils, or soils with a cementation class of “strongly cemented” or greater.

117. "Rock-plant filter" means a designed system which utilizes treatment media and various wetland plants to provide treatment of wastewater through biological, physical, and chemical processes. Also called a constructed wetland.

118. "Sand filter" means an engineer designed OWTS that utilizes a 24” or greater layer of specified sand as filter and treatment media and incorporates pressure distribution.

119. "Sand filter, lined" means an engineer designed OWTS that has an impervious liner and under-drain below the specified sand media. Lined sand filters may be intermittent / single pass where the effluent is distributed over the sand bed a single time before distribution to a soil treatment area, or re-circulating where part of the effluent is returned to an earlier component for additional treatment before distribution to a soil treatment area.

120. "Sand filter, unlined" means an engineer designed OWTS that includes a layer of specified sand used as a treatment media without a liner between the sand and the existing soil on which it is placed.

121. "Seepage pit" means an excavation deeper than it is wide that receives septic tank effluent and from which the effluent seeps from a structural internal void into the surrounding soil through the bottom and openings in the side of the pit.

122. "Septage" means a liquid or semisolid that includes normal household wastes, human excreta, and animal or vegetable matter in suspension or solution generated from a residential septic tank system. Septage may include such material issued from a commercial establishment if the commercial establishment can demonstrate to the Division that the material meets the definition for septage set forth in this subsection. Septage does not include chemical toilet residuals.

123. "Septic tank" means a watertight, accessible, covered receptacle designed and constructed to receive sewage from a building sewer, settle solids from the liquid, digest organic matter, store digested solids

through a period of retention, and allow the clarified liquids to discharge to other treatment units for final disposal.

124. Sequential Distribution” means a distribution method in which effluent is loaded into one trench and fills it to a predetermined level before overflowing to the succeeding trench through a drop box. effluent does not pass through the distribution media before it enters any succeeding trenches. The effluent is dispersed through a drop box at the proximal end of the system, allowing for portions of the absorption area to be isolated.

125. "Serial distribution" means a distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief pipe or device to the succeeding trench. The effluent passes through the distribution media before entering succeeding trenches which may be connected to provide a single uninterrupted flow path.

126. "Sewage" means a combination of liquid wastes that may include chemicals, house wastes, human excreta, animal or vegetable matter in suspension or solution, and other solids in suspension or solution, and that is discharged from a dwelling, building, or other establishment. See also Wastewater, domestic.

127. "Sewage treatment works" has the same meaning as "domestic wastewater treatment works" under section 25-8-103, C.R.S.

128. "Site evaluation" means a comprehensive analysis of soil and site conditions for an OWTS.

129. "Site evaluator" means a practitioner who conducts preconstruction site evaluations, including visiting a site and performing soil analysis, a site survey, or other activities necessary to determine the suitability of a site for an OWTS.

130. "Slit trench latrine" means a temporary shallow trench for use as disposal of non-water-carried human waste.

131. "Soil" means 1. unconsolidated mineral and/or organic material on the immediate surface of the earth that serves as a medium for the growth of plants and can potentially treat wastewater effluent; 2. unconsolidated mineral or organic matter on the surface of the earth that has been subjected to and shows effects of: a) pedogenic and environmental factors of climate (including water and temperature effects) and b) macro and microorganisms, conditioned by relief, acting on parent material over a period of time.

132. "Soil evaluation" means a percolation test, soil profile, or other subsurface soil analysis at the depth of a proposed soil treatment area or similar component or system to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed or as an application rate of gallons per square foot per day.

133. "Soil horizon" means layers in the soil column differentiated by changes in texture, color, redoximorphic features, bedrock, structure, consistence, and any other characteristic that affects water movement or treatment of effluent.

134. "Soil morphology" means 1. physical constitution of a soil profile as exhibited by the kinds, thickness, and arrangement of the horizons in the profile; and by the texture, structure, consistence, and porosity of each horizon; and 2. visible characteristics of the soil or any of its parts.

135. "Soil profile test pit excavation" means a trench or other excavation used for access to evaluate the soil horizons for properties influencing effluent movement, bedrock, evidence of seasonal high ground water, and other information to be used in locating and designing an On-site Wastewater Treatment System.

136. "Soil structure" means the naturally occurring combination or arrangement of primary soil particles into secondary units or peds; secondary units are characterized on the basis of type, size class, and grade (degree of distinctness).

137. "Soil texture" means proportion by weight of sand, silt, and clay in a soil.

138. "Soil treatment area" means the physical location where final treatment and dispersal of effluent occurs. Soil treatment area includes drainfields, mounds and drip fields.

139. "Soil treatment area, alternating" means final treatment and distribution component that is composed of two soil treatment areas that are independently dosed.

140. "Soil treatment area, sequencing" means a soil treatment area having more than two sections that are dosed on a frequent rotating basis.

141. "State Waters" has the meaning set forth under section 25-8-103. C.R.S.

142. "Strength, wastewater" means the concentration of constituents of wastewater or effluent; usually expressed in mg/L.

143. "Suitable soil" means a soil which will effectively treat and filter effluent by removal of organisms and suspended solids, which meets long-term acceptance rate requirements as defined in Table 10-1, and has the required vertical thickness below the infiltrative surface and above a limiting layer.

144. “Systems Cleaner” means a person engaged in and who holds themselves out as a specialist in the cleaning and pumping of on-site wastewater treatment systems and removal of the residues deposited in the operation thereof.

145. "Systems Contractor” means a person engaged in and who holds themselves out as a specialist in the installation, renovation, and repair of on-site wastewater treatment systems.

146. “Systems Maintenance Provider” means a person engaged in and who holds themselves out as a specialist in routine or periodic actions taken to assure that the on-site wastewater treatment system is functioning as intended, and/or that the on-site wastewater treatment system is meeting performance requirements.

147. “Tiny Home” means a structure (a non-recreational vehicle) that has only one bedroom and has 400 sq.ft. or less of livable space, including lofts. In this instance, the OWTS may be sized for only one bedroom.

148. "Total suspended solids" means measure of all suspended solids in a liquid; typically expressed in mg/L.

149. "Transfer of Title" means change of ownership of a property.

150. “Transfer of Title Inspector” means a person engaged in and who holds themselves out as a specialist in conducting evaluations and observations of an existing on-site wastewater treatment system serving a structure that is proposed for property transfer, to assess if the system is functioning as intended.

151. "Treatment level" means defined concentrations of pollutants to be achieved by a component or series of components of an OWTS.143.

152. "Treatment media" See Media, treatment.

153. "Treatment unit" means a component or series of components where solids or pollutants are removed from wastewater or effluent from a preceding component.

154. "Trench" means 1. below-grade soil treatment area consisting of a shallow excavation with a width of 3 feet or less containing distribution media and one lateral; and 2. excavation for placement of piping or installation of electrical wire or conduit.

155. "Uniformity coefficient" means a value which is the ratio of D60 to D10 where D60 is the soil diameter of which 60 percent of the soil weight is finer and D10 is the corresponding value at 10 percent finer. (A soil having a uniformity coefficient smaller than 4 would be considered "uniform" for purposes of this regulation.)

156. “Vault” means a watertight, covered receptacle, which is designed to receive and store excreta or wastes either from a building sewer or from a privy and is accessible for the periodic removal of its contents. If the vault is intended to serve a structure or structures that are projected to generate a domestic wastewater flow of greater than two thousand gallons per day at full occupancy, the vault would be considered a domestic wastewater treatment works. Vaults are on-site wastewater treatment systems

157. "Visual and tactile evaluation of soil" means determining the properties of soil by standardized tests of appearance and manipulation in the hand.

158. "Volume, effective" means the amount of effluent contained in a tank under normal operating conditions; for a septic tank, effective volume is determined relative to the invert of the outlet. For a dosing tank, the effective volume under normal conditions is determined relative to the invert of the inlet and the control off level.

159. "Wastewater, domestic" means combination of liquid wastes (sewage) which may include chemicals, household wastes, human excreta, animal or vegetable matter in suspension or solution, or other solids in suspension or solution which are discharged from a dwelling, building or other structure.

160. "Wastewater, high strength" means 1. wastewater from a structure having $BOD_5$ greater than 300 mg/L; and/or TSS greater than 200 mg/L; and/or fats, oils, and grease greater than 50 mg/L; or, 2. effluent from a septic tank or other pretreatment component (as defined by NSF/ANSI Standard 40 testing protocol) that has $BOD_5$ greater than 180 mg/L; and/or TSS greater than 80 mg/L; and/or fats, oils, and grease greater than 25 mg/L and is applied to an infiltrative surface.

161. "Wastewater pond" means a designed pond which receives exclusively domestic wastewater from a septic tank and which provides an additional degree of treatment.

162. “Watercourse" means a natural or artificial channel through which water flows, either continuously or intermittently, and exhibits a connection to an actual or elevated groundwater table. A watercourse includes the bed of a channel that flows only seasonally (e.g., creek, stream, irrigation ditch). hollows, ravines, or roadside ditches that are normally dry are not considered a watercourse.

163. "Water Quality Control Commission" See Commission.

164. "Water Quality Control Division" See Division.

165. "Wetland, constructed" See Rock-plant filter.

166. "Wetlands" means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs and similar areas and may be mapped on the United States Fish and Wildlife Service’s National Wetlands Inventory.

**Table 3-1 Abbreviations and Acronyms**

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| ANSI | American National Standards Institute |
| ASTM | American Society for Testing and Materials |
| BOD | Biochemical Oxygen Demand |
| C.R.S. | Colorado Revised Statutes |
| CBOD | Carbonaceous Biochemical Oxygen Demand |
| CPOW | Colorado Professionals in Onsite Wastewater |
| CSA | Canadian Standards Association |
| ETL | Electrical Testing Laboratories |
| GPD | Gallons per day |
| GPPD | Gallons per person per day |
| IAPMO | International Association of Plumbing and Mechanical Officials |
| ISDS | Individual Sewage Disposal System |
| LTAR | Long-term Acceptance Rate |
| MG/L | Milligrams per Liter |
| MPI | Minutes Per Inch |

| | |
|---|---|
| NAWT | National Association of Wastewater Technicians |
| NDDS | Non-pressurized Drip Dispersal System |
| NPCA | National Precast Concrete Association |
| NSF | NSF INTERNATIONAL |
| NRTL | Nationally Recognized Testing Laboratory |
| OWTS | On-site Wastewater Treatment System(s) |
| STA | Soil Treatment Area |
| TL | Treatment Level |
| TN | Total Nitrogen |
| TSS | Total Suspended Solids |
| UL | Underwriters' Laboratories |

## 43.4 Applicability and Administration

A. Regulation Coverage

1. An OWTS with design capacity less than or equal to 2,000 gpd must comply with this regulation and the OWTS Act. Within the jurisdiction of the Department, the regulations promulgated by the local Board of Health govern all aspects of OWTS permits, performance, location, construction, alteration, installation, and use.

2. An OWTS with design capacity greater than 2,000 gpd must comply with this regulation, site location and design approval in section 25-8-702, C.R.S., and the discharge permit requirements in the Water Quality Control Act, 25-8-501, et seq. C.R.S.

    a. Applicable Commission regulations include, but are not limited to, the following:

        (1) Regulation 22 - Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works (5 CCR 1002-22).

        (2) Regulation 41 - The Basic Standards for Ground Water (5 CCR 1002-41).

        (3) Regulation 42 - Site-Specific Water Quality Classifications and Standards for Ground Water (5 CCR 1002-42).

        (4) Regulation 61 - Colorado Discharge Permit System Regulations (5 CCR 1002-61).

        (5) Regulation 62 - Regulations for Effluent Limitations (5 CCR 1002-62).

b. For systems greater than 2,000 gpd, the Division is also authorized to determine those parts of this regulation identified as the prerogative of the local public health agencies.

c. The requirements for maintenance and standards of performance for systems greater than 2,000 gpd shall be determined by the site application approval and discharge permit.

d. In the interest of facilitating communication of concerns regarding a design being reviewed by the Division, the Department can provide comments to the Division for consideration during the Division's review of the proposed design and discharge permit application. Under such a coordinated process, the Division retains final authority for approval or denial of each domestic wastewater treatment works that is regulated under the site location approval and Colorado Discharge Permit System regulations. Prior to approval or denial of each OWTS domestic wastewater treatment works, the Division must acknowledge and consider local OWTS regulations when they are more stringent and restrictive than this regulation.

B. Permit Application Requirements and Procedures

1. Prior to commencing construction, any person who wishes to install, alter, or repair an OWTS in Larimer County, Colorado, shall obtain a permit from the Department.

2. An applicant must submit a complete application that is consistent with section 43.4.B.3. to the Department prior to installing, altering or repairing a system.

3. Minimum Permit Application Requirements:

a. Owner name and contact information;

b. Property address;

c. Property legal description;

d. Type of permit;

e. Report from Site and Soil Evaluation (section 43.5);

f. System design with a legible, accurate site plan which shows pertinent physical features on subject property, and on adjacent properties, as noted in Table 7-1; and

g. Other information, data, plans, specifications and tests as required by Department.

(1) When specific evidence suggests undesirable soil conditions exist, additional hydrological, geological, engineering or other information provided by a professional engineer or geologist may be required to be submitted by the applicant. This requirement will not prejudice the right of the Department to develop its own information from its own source at its own expense.

h. The applicant for any permit may be required to satisfy any outstanding fines assessed by the Department before the license is issued.

4. Permit Fees

   a. A permit fee as established by the Board of Health shall be required of applicants for all OWTS, payable at the Larimer County Department of Health and Environment. The permit fees may be no greater than required to offset the actual indirect and direct costs of the Department per 25-10-107, C.R.S.

   b. Permit application fees must be submitted by an applicant with the permit application, and are due and payable upon receipt of the permit application.

5. Other Fees

   a. The Board of Health may set fees for inspections, soil evaluation, and other services performed by the Department. The fees must be no greater than required to offset the actual indirect and direct costs of the services, and must not exceed the maximum amounts specified in section 25-10-107, C.R.S.

   b. Surcharge - the local public health agency must collect a fee for each permit issued for a new, repaired, or upgraded OWTS and transmit funds to the Colorado Department of Public Health and Environment for use in funding the state's OWTS program, as identified in the on-site wastewater treatment system act 25-10-107(3) c.r.s. until replaced by a fee(s) becoming effective in regulation 102 adopted under section 25-8-210(1)(a)(x) c.r.s.

6. Permit Term

   a. An OWTS permit expires one year after the date of issuance if construction of the system has not commenced. If both a building permit and an OWTS permit are issued for the same property and construction of the OWTS has not commenced prior to the expiration date of the building permit, the OWTS permit will also expire. The OWTS permit may be renewed and extended at the same time as the building permit, provided the requirements in 43.4.B.6.c. below are met.

   b. If an OWTS permit is issued for property on which no building permit is required, the permit shall expire 180 days after its issuance if construction of the system has not commenced.

   c. An expired permit may only be extended or renewed if:

      (1) There has been no change in the plans and specifications of the proposed system as set out in the original application; and

      (2) The surrounding land, its use or zoning, have not changed so as to cause the original application not to be acceptable under these Regulations; and

      (3) The property has not received verifiable complaints or code compliance violations that may preclude the Department from determining that a permit extension is warranted; and

      (4) The application for extension or renewal is submitted to the Department not less than 30 days before the expiration of the original permit and meets all of the requirements of the original permit, including fees in instances where changes in design or location require additional site inspections and data evaluation.

d. Any change in plans or specifications of the OWTS after the permit has been issued invalidates the permit unless the permittee receives written approval from the Department for such changes.

7. Repair Permit

a. The owner or occupant of a property on which an OWTS is not in compliance must obtain a repair permit from the Department. The applicant must apply for a repair permit within two business days after receiving notice from the Department that the system is not functioning in compliance with the OWTS Act or applicable regulations, or otherwise constitutes a nuisance or a hazard to public health or water quality.

b. The repair permit must provide for a reasonable period of time within which the owner or occupant must make repairs. At the end of that period, the Department must inspect the system to ensure it is functioning properly. Concurrently with the issuance of a repair permit, the Department may issue an emergency use permit authorizing continued use of a malfunctioning system on an emergency basis for a period not to exceed the period stated in the repair permit. Such an emergency use permit may be extended, for good cause shown, in the event repairs may not be completed in the period stated in the repair permit through no fault of the owner or occupant and only if the owner or occupant will continue to make repairs to the system.

c. A Major Repair Permit is required for any repair that includes replacement, expansion, relocation, or upgrade to a soil treatment area.

d. A Minor Repair Permit is required for replacement of a septic tank, addition of a septic tank to an existing system, or installation of a new lift station to an existing system.

8. Permit approvals to remodel or expand the use of an existing OWTS. Prior to this Department's approval of a building permit to remodel, add to, or modify the use of a residential or commercial structure served by an OWTS, a remodel permit to increase the size or replace the existing OWTS must be issued, except as in a. & b. below;

a. For residential systems, the proposed building project or remodel will not increase the number of bedrooms as defined by this Regulation, or it is determined that the existing system is adequately designed and constructed for the higher design flow rate.

b. For commercial systems, the proposed project or change in use will not increase the average daily flow or wastewater strength above and beyond the original design of the system.

9. Denial of a permit application by the Department will be made in writing and describe conditions which led to the denial. Any permit application denied by the Department may be appealed and reviewed by the Board of Health upon written request of the applicant within 60 days of the denial.

10. The issuance of a permit and specifications of terms and conditions therein will not constitute assumption of liability, nor create a presumption that the Department or its employees may be liable for the failure or malfunctioning of any system. Permit issuance will not constitute a certification that the system, the equipment used in the system, or any component used for

system operation will ensure continuous compliance with the provision of the OWTS Act, the regulations adopted thereunder, or any terms and conditions of a permit.

11. No OWTS permit shall be issued to any person when the subject property is located within a municipality or special district providing sewer service, or when the property line is within 400 feet of a sewer line providing public sewer service, except where such service to the property is not feasible in the determination of the municipality or sewer district, or the OWTS permit is otherwise authorized by the municipality or sewer district.

C. Determination

1. The Department must determine whether the information provided in the permit application, site and soil evaluations, assumptions and calculations, and design of the proposed OWTS are in compliance with the requirements of the OWTS Act and regulations adopted pursuant thereto. If the submittal is determined to be in compliance, authorization to begin installation may be given.

D. Access to Site

1. For the purpose of inspecting and enforcing applicable regulations and the terms and conditions of any permit issued and investigating and responding to complaints, the Department is authorized to enter upon private property at reasonable times and upon reasonable notice for the purpose of determining whether or not an operating OWTS is functioning in compliance with the OWTS Act and applicable regulations adopted pursuant thereto and the terms and conditions of any permit issued and to inspect and conduct tests in evaluating any permit application. The owner or occupant of every property having an OWTS must permit the Department access to the property to make inspections, conduct required tests, take samples, and monitor compliance.

E. Inspection Stages

1. When construction of an OWTS, or an OWTS component has been completed, and prior to backfilling or placing the system into use, the owner, the owner's agent, or the system contractor must notify the Department, and the engineer, if engineer designed. A representative of the Department shall make a final inspection within 24 hours or at a later agreed time after receipt of notice, Saturdays, Sundays, and holidays excepted.

2. A system designed to utilize pressure distribution must be tested in operation to evaluate function of floats, control panel, alarm/signaling device, and to ensure adequate residual pressure at the end of distribution lines. The pump or dosing tank must be filled with water in order to test the components above, and pumped or drained after testing if necessary to prevent freezing.

F. Final approval of the permit by the Department must include, but is not limited to:

1. Receipt of letter from the engineer certifying construction of the OWTS as per the approved design, if the OWTS was engineer designed per section 43.10.B;

a. For designs that include a pressurized distribution system, a residual head test (squirt height), at the distal end of each lateral, must be conducted to determine the adequacy of system design and construction. Results from this inspection must be included within both the engineer’s certification and the final permit acceptance documents

2. A record drawing provided by the applicant which includes a scale drawing showing all components of the OWTS including their location from known and findable points, dimensions, depths, sizes, manufacturers' names and models as available, and other information relative to locating and maintaining the OWTS components;

3. Final inspection prior to backfilling the OWTS by the Department confirming that it was installed according to the permit requirements and regulations or variances to the regulations; and

4. Identification of system contractor.

G. Division Authority to Administer and Enforce

1. Wherever the term Board of Health or Department is used in this regulation, said terms also include the Division under its designated authority for the purposes of administering and enforcing the provisions of this regulation where necessary to protect the public health and environment.

H. Primary Enforcement Responsibility

1. The primary responsibility for enforcement of the provisions of the OWTS Act and the regulations adopted under said article will lie with the local Board of Health.

2. In the event that the Board of Health fails to administer and enforce the provisions of said section and the regulations adopted under the OWTS Act, the Division may assume such functions of the Department or Board of Health as necessary to protect the public health and environment. 25-10-110, C.R.S.

I. Product Development Permit

1. For products that have not received Division acceptance under section 43.13.D, the manufacturer may apply to the Department for a product development permit. Requirements for proprietary treatment product acceptance are located in section 43.13.D of this regulation.

2. For products or types of systems which have not been otherwise accepted by the division pursuant to section 43.13.d, the local board of health may approve an application for product development permit only if the system has been designed by a professional engineer, and only if the application meets all requirements of section 43.4.i, items 3 through 11.

3. Before a product development permit is issued, the Division must determine that the product to be tested qualifies for testing under the product development evaluation based on information submitted to the Division.

a. Applicant must provide evidence of nationally accepted third-party testing of the product to be evaluated, or;

b. Provide test data from multiple single-family homes under normal working conditions that meet the following criteria:

(1) Test data must be provided from a minimum of four sites.

(2) Each system must be tested over a period of at least one year.

(3) Each system must be sampled at least three times during the year with at least one sample obtained during cold weather conditions.

(4) Laboratory results for all parameters for which acceptance is being requested must be submitted.

4. The Board of Health must not arbitrarily deny any person the right to consideration of an application for such a system and must apply reasonable performance standards in determining whether to approve such an application; 25-10-108 (2), C.R.S.

5. A completed application for a product development permit must be submitted to the Department at least 30 days in advance of installation of the product.

6. An application for a product development permit must include the following:

   a. Proof of the ability to install a replacement OWTS in compliance with all requirements in a timely manner in the event of a failure or malfunction of the system under testing;

   b. A description of the product under development including performance goals;

   c. Documentation signed by the owner of the proposed product development site allowing access to the Department and Division for inspection of the site; and

   d. Design documents as required in section 43.5.G of this regulation.

7. Other than the performance standards identified in section 43.4.I(3) above, the Department may stipulate additional requirements for the product development permit necessary to ensure that the system performs as intended.

8. A product development permit is a site-specific permit. Product development testing at multiple sites requires a product development permit for each site.

9. During the term of the product development permit, all data collected is to be submitted to the Division and the Department.

10. The Department may revoke or amend a product development permit, if the continued operation or presence of the product under development:

    a. Presents a risk to the public health or environment;

    b. Causes adverse effects on the proper function of the OWTS on the site;

    c. Leaks or discharges effluent on the surface of the ground; or

    d. If the developer of the product fails to comply with any requirements stipulated on the permit by the Department or the Division.

11. If the product development permit is revoked, the product developer must install the replacement system within the time frame established by the Department.

12. Once the system is installed and approved, the Department must supply the Division with a copy of the completed OWTS permit.

J. Prohibition of OWTS in Unsuitable Areas

1. The Board of Health may prohibit issuance of OWTS permits or limit the type of system installed in accordance with applicable land use laws and procedures for defined areas in which the Board of Health determines that construction and use of additional OWTS may constitute a hazard to public health or water quality.

K. Licensing of Systems Contractors and Systems Cleaners

1. The Department may charge a fee not to exceed actual costs for the initial license and renewal of a systems contractor, systems cleaner, systems maintenance provider, or transfer of title inspector license. Initial licenses and renewals must be issued for a period of not less than one year. Renewals may be scheduled to coincide with the calendar year. the applicant for any license may be required to satisfy any outstanding fines assessed by the Department before the license is issued.

2. The Department may suspend or revoke the license of a systems contractor, systems cleaner, systems maintenance provider, or transfer of title inspector for violations of the OWTS act, these regulations, or for other good cause shown. suspension or revocation shall occur only after a hearing conducted upon reasonable notice to the licensee, at which the licensee may be present, represented by counsel, and heard per c.r.s 25-10-109.

3. The Department may require an inspection of each vehicle used to service OWTS at a frequency determined by the Department to ensure compliance with applicable regulations.

L. Variance Procedure

1. General

a. An applicant for a permit to construct a new OWTS or to repair or upgrade an existing OWTS may request a variance from any portion of this Regulation, except as prohibited in Section 43.4.L.5

b. The Director of the Larimer County Environmental Health Division is delegated the authority to grant a variance from those portions of the Larimer County OWTS Regulations that are more stringent than Regulation 43 when compelling justification is present and the variance does not endanger the public health. Any Division rulings on these variances may be appealed to the Larimer County Board of Health, using the procedure described in 43.4.L.7 below. The Division may also choose to refer requests for a variance to the Larimer County OWTS Regulations directly to the Board of Health.

c. The Board of Health may set fees for processing an OWTS permit with a variance in accordance with section 25-10-107, C.R.S. This permit fee may be the standard OWTS permit fee or may be a separate fee based upon the cost of processing a permit with a variance.

2. Requirements for Variance Consideration

a. The Board of Health will determine what type of variances will require public hearings. Prior to the rendering a decision on a variance request requiring a public hearing, a public hearing must be held. The hearing must be the subject of a public notice or notice must be sent via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners.

b. Variance requests must be accompanied by:

(1) Site-specific request identifying the specific criteria from which a variance is being requested;

(2) Technical justification by a professional engineer or professional geologist, which indicates the specific conditions which exist and/or the measures which

will be taken that support a finding that the variance will result in no greater risk than that associated with compliance with the requirements of the regulation. Examples of conditions which exist, or measures which might be taken, include but are not limited to the following: evidence of a natural or manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; placement of a manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; soil replacement with sand filter media to reduce the infiltration rate of the effluent such that the travel time of the effluent from the absorption field to the physical feature is no less than the travel time through the native soils at the prescribed setback and Treatment Level;

(3) A discussion of alternatives considered in lieu of the requested variance;

(4) Technical documentation for selected alternative, which may include a testing program, which confirms that the variance does not increase the risk to public health and to the environment; and

(5) A statement of the hardship that creates the necessity for the variance.

c. The applicant has the burden of proof to demonstrate that the variance is justified and will pose no greater risk to public health and the environment than would a system meeting the regulations.

3. The Board of Health has the authority to impose site-specific requirements and conditions on any variance granted.

4. Outcome of the Variance Proceeding

a. The applicant must be notified, in writing, of the Board of Health's decision regarding the request for a variance. The notice of a denial of a variance must include those reasons which form the basis for the denial. The notice of an approval of a variance must include any conditions of the approval. The variance, and any conditions thereof, must be recorded on the deed to the property and any expenses associated with that recording must be the responsibility of the party obtaining the variance.

5. Prohibitions on the Granting of Variance Requests

a. No variance shall be issued where the property can accommodate a conforming OWTS.

b. No variance shall be issued to mitigate an error in construction involving any element of property improvements.

c. No variance shall be allowed solely for economic gain.

d. No variance shall be issued, if it will result in a setback reduction to an offsite physical feature that does not conform to the minimum setbacks defined in Table 7-1 of this regulation without the Board of Health considering any concerns of the owner of property containing said feature. Property lines are considered offsite features. The property owner containing said feature must be notified of the time and date of the hearing.

e. No variance shall be issued, if it reduces the separation to ground water or bedrock based on the level of treatment in Table 7-2.

f. No variance from the horizontal setback from a well shall be issued unless it also meets the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.

g. No variance shall be issued for the installation of a higher level treatment system based on sizing or separation reductions without the LPHA having a maintenance and oversight program as defined in section 43.14.D.

6. Variances for Repair of Failing Systems

a. When a proposed variance for a system repair or upgrade would result in encroachment on minimum distances to physical features on neighboring properties required by the Division, the public hearing procedures in 43.4.n.2 and 43.4.n.5.d above must be followed.

b. For the repair of or upgrade to an existing system where the existing system does not meet the required separation distances and where conditions other than lot size precludes adherence to the required distances, a variance to the separation distances may be requested. The repairs or upgrade must be no closer to features requiring setbacks than the existing facilities. Variances requesting setbacks no closer than existing setbacks are not required to provide technical justification from a professional engineer or professional geologist, nor is a public hearing required to consider the request.

7. Findings on Appeal

a. A request for review must be made within 60 days after denial of an application by the Department.

b. The applicant must bear the burden of supplying the Board of Health with sufficient evidence to document that the denied system will be constructed and used in such a manner that will result in no greater risk than that associated with compliance with the requirements of the regulation, comply with the declaration and intent of this regulation, and comply with all applicable state and local regulations and required terms and conditions in any permit.

c. Such review must be conducted pursuant to the requirements of section 24-4-105, C.R.S.

M. General Prohibitions; Section 25-10-112, C.R.S.

1. No city, county, or city and county shall issue to any person:

a. A permit to construct or remodel a building or structure, WHICH INCLUDES PLUMBING, that is not serviced by a sewage treatment works until the Department has issued a permit for an OWTS.

b. An occupancy permit for the use of a building that is not serviced by a sewage treatment works until the Department makes a final inspection of the OWTS, provided for in section 25-10-106 (1) (h), C.R.S. and the Department approves the installation.

2. No person shall;

a. Construct or maintain any dwelling or other occupied structure which is not equipped with adequate facilities for the sanitary disposal of sewage. “Adequate facilities” do not include OWTS that are deemed to be failed, or any such condition that the local public health agency determines to be a public health and/or safety concern.

b. Construct a new occupied structure that includes plumbing, without connecting to a domestic wastewater treatment works or obtaining an OWTS permit issued by the local public health agency and installing a compliant OWTS.

3. The construction of new, or the repair of existing cesspools, pit privies, wastewater ponds, or slit trenches is prohibited except as in 43.12.B.2.h. Where an existing cesspool is failing, a conforming OWTS must be installed. Where space is not available for a conforming OWTS, the criteria for repairs established within section 43.10.I must be followed.

4. A person must not connect more than one dwelling, commercial, business, institutional or industrial unit to the same OWTS unless such multiple connection was specified in the application submitted and in the permit issued for the system.

5. An OWTS must receive only such biodegradable wastes for treatment and distribution as are compatible with those biological treatment processes that occur within the septic tank, any additional treatment unit, and the soil treatment area. This does not include industrial, animal, or process waste

6. All persons shall dispose of septage removed from systems in the process of maintenance or cleaning at an approved site and in an approved manner.

N. Enforcement

1. Cease and Desist, Placards, Revocations, Liens, & Recordings

a. The Department may issue an order to cease and desist from the use of any OWTS or sewage treatment works which is found by the health officer not to be functioning in compliance with the OWTS Act or applicable regulations, is found to constitute a nuisance or hazard to public health, or has not otherwise received timely repairs under the provisions of these Regulations, pursuant to Section 25-10-106(1)(j), C.R.S. Such an order may be issued only after a hearing conducted by the health officer not less than forty-eight (48) hours after written notice thereof is provided to the owner or occupant of the property on which the system is located. The order shall require that the owner or occupant bring the system into compliance or eliminate the health hazard within thirty (30) days, or thereafter cease and desist from use of the system. A cease-and-desist order issued by the health officer shall be reviewable in the district court for the county in which the system is located upon petition filed not later than ten (10) days after the order is issued.

b. When the Department determines that an on-site wastewater treatment system serving a multi-family dwelling, including but not limited to a mobile home park, is failing, is not adequately sized for the existing or proposed occupancy, or otherwise does not comply with these regulations, the Department may limit occupancy, restrict additional connections, restrict the allowable gallons of effluent, or reduce the number of dwelling units permitted to be occupied until the system is brought into compliance. Such an order may be issued only after a hearing conducted by the health officer not less than forty-eight (48) hours after written notice is provided to the owner or occupant of the property.

c. When the Department determines that there is evidence an on-site wastewater treatment system has failed and has not been repaired in accordance with these regulations, the Department may declare the dwelling uninhabitable and post a placard to that effect. the placard shall remain in place until removed by an authorized representative of the Department. It shall be a violation of these regulations for any person to remove, damage, alter, deface, cover, or obstruct from view such placard without authorization from the Department.

d. The Department may suspend, revoke, deny renewal of, or impose conditions on any permit or license issued under these regulations if the permittee or licensee fails to comply with minimum technical standards, installation or maintenance requirements, inspection protocols, or any other applicable provision. Substandard workmanship, failure to correct identified deficiencies, or demonstrated inability or unwillingness to meet regulatory obligations constitutes grounds for such action. Before taking action, the Department will provide written notice of the violations and an opportunity to respond in accordance with due process.

e. The Department is authorized to record a notice of violation for any violation of these regulations affecting real property with the Larimer County clerk and recorder's office, and such notice shall remain on record until the Department determines the violation has been corrected and records a release.

f. The Department is further authorized to place a lien with the larimer county clerk and recorder's office upon the property for any costs incurred in connection with recording the notice of violation, as well as for any unpaid fines, fees, or additional administrative costs, or costs associated with additional investigations or inspections for noncompliance with these regulations. In determining the total amount required to satisfy the lien, the Department may consider any reasonable costs associated with ensuring compliance on the part of the responsible party. Such liens shall be recorded in compliance with colorado statutes and in coordination with the Larimer County attorney's office and shall remain in effect until satisfied or released by the Department in accordance with state law and due process.

2. Penalties; Section 25-10-113, C.R.S.

a. Any person who commits any of the following acts or violates any of the provisions of this section commits a civil infraction as defined in section 18-1.3-503, C.R.S.:

(1) Constructs, alters, installs, or permits the use of any OWTS without first having applied for and received a permit as provided for in section 25-10-106, C.R.S.;

(2) Constructs, alters, or installs an OWTS in a manner which involves a knowing and material variation from the terms or specifications contained in the application, permit or variance;

(3) Violates the terms of a cease and desist order that has become final under the terms of section 25-10-106 (1) (k), C.R.S.;

(4) Conducts business as a systems contractor without having obtained the license required under section 25-10-109(1), C.R.S., in areas where the Board of Health has adopted licensing regulations pursuant to that section, and/or performs work on a system without first obtaining the required permit for the project.

(5) Conducts a business as a systems cleaner without having obtained the license provided for in section 25-10-109 (2), C.R.S., in areas which the Board of Health has adopted licensing regulations pursuant to that section;

(6) Conducts a business as a systems inspector without having obtained the license provided for in section 25-10-109 (2), C.R.S., in areas which

the board of health has adopted licensing regulations pursuant to that section;

(7) Falsifies or maintains improper records concerning system cleaning activities not performed or performed improperly; or

(8) Willfully fails to submit proof of proper maintenance and cleaning of a system as required by regulations adopted by the Board of Health.

3. Upon a finding by the Board of Health that a person is in violation of this regulation, or of rules adopted and promulgated pursuant to section 25-10-104, the Board of Health may assess a penalty of up to fifty dollars for each day of violation. In determining the amount of the penalty to be assessed, the Board of Health shall consider the seriousness of the danger to the health of the public caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

4. A person subject to a penalty assessed pursuant to section 43.4.Q.2 may appeal the penalty to the Board of Health by requesting a hearing before the appropriate body. The request must be filed within thirty days after the penalty assessment is issued. The Board of Health shall conduct a hearing upon the request in accordance with section 24-4-105, C.R.S.

O. Transfer of Title

1. Prior to the sale or transfer of title of the property, the owners of the property shall obtain an Acceptance Document from this Department, unless exempt or waived as noted in 43.4.P.4(a-g) below.

2. In order to obtain an Acceptance Document, property owners of a residence or other building or facility served by an OWTS shall have an inspection performed to demonstrate that the system is functioning according to design prior to the sale or transfer of title of the property. Nothing in this section prevents a buyer from completing the inspection requirement if agreed upon by property owner and the buyer.

3. Transfer of Title inspections must be completed by a Certified Inspector who has been certified under the National Sanitation Foundation (NSF) Onsite Wastewater Inspector Accreditation Program, the National Association of Wastewater Technicians (NAWT) Onsite Wastewater Inspector Program, or equivalent level of training and experience as established by the Department.

a. Inspectors meeting the above criteria must obtain a license issued by LCDHE prior to completing inspections of OWTS in Larimer County. A fee not to exceed actual costs may be charged by the Department for the initial license of a Certified Inspector. A fee not to exceed actual costs may be charged by the Department for a renewal of the license. Licenses shall be valid for a period of one year from the date of issuance.

b. The Department shall provide and maintain a list of Certified Inspectors to the general public through the Department's website.

c. The Department may decertify any Certified Inspector under any of the following circumstances:

(1) The Certified Inspector submits false or misleading information.

(2) The Certified Inspector does not maintain the required certification as required by these regulations.

(3) Any situation that is determined by the Department which does not comply with the intent of this section.

4. The following properties and situations are exempt from the requirement to obtain a Transfer of Title Acceptance Document:

   a. The property is served by an OWTS that was installed and given final approval by this Department less than three years of the current closing date of the property.

   b. The change in ownership is not an arm's length transaction. Examples of non-arm's length transactions include, but are not limited to, transfers between family members, parents and children and estate transactions between a spouse, parent, or child.

   c. The change in ownership is creating or ending a joint ownership if at least one person is an original owner of the property and/or the spouse, parent or child of an original property owner.

   d. The transfer of property is to a trust in the same name as the original owner, or to a limited liability company, if the original owner is one of the directors of the limited liability company.

   e. The transfer of property is a result of foreclosure or forfeiture of real property. However, the subsequent transfer of the property from the foreclosing entity to a new buyer would require inspection of the system and an Acceptance Document.

   f. The property owner has obtained a major repair or remodel permit for the OWTS which has not expired, the requirement to complete the repairs has been disclosed to the person acquiring title to the property, and they have agreed to assume the original applicant's responsibilities to complete the necessary repair or construction within the timeframe dictated by the permit.

   g. Vaulted privies, systems without a dwelling or other permanent structure connected, and systems or components that are part of a community system with a design capacity of >2,000 gallons per day under the jurisdiction of the Water Quality Control Division.

5. Obtaining a Transfer Applications for Transfer of Title Acceptance Documents, and inspection reports for such a purpose, must be submitted using the electronic reporting system provided by this Department. The inspection report cannot be dated more than twelve (12) months prior to the date of the Acceptance Document application and must contain the following:

   (1) Owner's name and contact information;

   (2) Physical address of property;

   (3) Legal description of property;

   (4) Name of Inspector, Inspector's NAWT or other applicable certification number;

   (5) Date and time of the inspection(s);

   (6) A record drawing showing the layout of the OWTS and all relevant setbacks. This requirement is waived if such a drawing is already on file with the Department and the system as inspected matches the plan on file.

(7) An inspection report for the OWTS which states whether each component is in good repair and proper working order;

(8) If the property is unoccupied, a statement of when the vacancy occurred.

(9) To the extent possible, the inspector must identify if the OWTS may be encroaching on the required setback to the onsite water supply. buried wells, snow cover, or other circumstances may prevent the inspector from making this determination. if such circumstances are encountered, they must be stated in the report; and

(10) The local public health agency may require a water quality analysis of the water supply (i.e.: nitrates, e. coli, etc.). For example, in cases where the OWTS encroaches on required setbacks to onsite or adjacent water supplies, or localized water quality concerns have been identified.

(11) A non-refundable transfer of title fee in the amount established by the Board of Health, as amended from time to time. The fee will be payable to the Department at the time the application is made.

6. Minimum Criteria

a. Items noted in the inspection report that do not comply with the following criteria and conditions must be corrected along with the appropriate repair permit and inspections, if necessary, prior to the issuance of a final acceptance document:

(1) All systems must have a tank that is structurally sound, in good working order, and provided with safe and secure lids. Systems without tanks, such as cesspools, must have a tank installed to meet this requirement;

(2) All internal devices and appurtenances such as tees, effluent screens and/or baffles must be intact and in working order;

(3) Alarms, control devices, and components necessary for the proper operation of the system are present and in good working order;

(4) A soil treatment area, or other means of subsurface wastewater treatment, must not be in a state of failure;

(5) Cesspools must be properly abandoned and a conforming OWTS must be installed. where site conditions preclude the installation of a conforming OWTS, the criteria for repairs established within section 43.10.i must be followed

(6) There are no unapproved wastewater discharges from the system or structure; and

(7) Any items meeting the conditions of a “Failure” as defined in this regulation have been corrected to the acceptance of the local public health agency.

7. If the system meets the minimum criteria set forth above a Transfer of Title Acceptance Document will be issued by the Department. The acceptance document will remain valid for a maximum period of twelve months from the date of inspection. The acceptance document will include;

a. Statement of the size, type and capacity of the system and a record drawing, either from the Department's records (verified by the inspector) or from the inspection reports;

b. If the inspection of the system reveals a discrepancy in the number of bedrooms currently in the residence and the permit record currently on file with the Department, the acceptance document will indicate the discrepancy, but the purchaser may choose to forego expansion of the OWTS.

c. A copy of the inspection report that was provided to the local public health agency.

d. Evidence of past system failures as shown in the Department's records;

e. Circumstances or factors that may have affected the ability of the inspector to evaluate the system;

f. Whether the system meets the permitting requirements of the Department; and

g. Other information the Department may require.

8. A Conditional Transfer of Title Acceptance Document may be issued in the following situations;

a. Agreement to Inspect - If site conditions prevent access to the property for performing an inspection, a Conditional Transfer of Title Acceptance Document may be issued if the person acquiring title to the property agrees in writing to have the inspection completed when conditions allow and, if needed, to obtain a repair or alteration permit within 180 days of the inspection.

b. Agreement to Repair - If the Department determines that the OWTS does not meet the requirements for issuance of a Transfer of Title Acceptance Document, the person acquiring title to the property may agree in writing through an Agreement to Repair to obtain a repair or alteration permit and complete all necessary repairs within 180 days of the closing date.

9. Revocation of a Transfer of Title Acceptance Document

a. The Department shall revoke a Transfer of Title Acceptance Document if it is determined that the system is no longer functioning in accordance with this regulation or that false or misleading material statements were made on the application or inspection reports.

b. Upon revoking a Transfer of Title Acceptance Document, the Department shall notify the current property owner of the revocation.

10. Penalties

a. Failure to obtain an acceptance document for a covered transaction as provided by this regulation will subject the owner who failed to obtain the document to a penalty assessed under section 25-10-113, C.R.S.

P. Properties Used as Short Term Rental

1. Unless the OWTS was originally designed for the use, prior to a receiving approval as a short term rental an application for a Change in Use Review must be submitted to this Department. The OWTS serving the dwelling must be adequately sized based on the number of proposed guests.

2. For residential dwellings used as a short term rental with a proposed occupancy of greater than 10, the minimum required design flow will be based on the maximum number of occupants at 75 gallons per person instead of the number of bedrooms.

3. For properties that will be used as a short term rental served by a sealed vault, a signaling device with both an audible and visual alarm is required.

4. Properties without an existing OWTS permit must have an inspection completed prior to applying for a Change in Use Review.

    a. Inspections must be completed by a Certified Inspector who has been certified under the National Sanitation Foundation (NSF) Onsite Wastewater Inspector Accreditation Program, the National Association of Wastewater Technicians(NAWT) Onsite Wastewater Inspector Program, or equivalent level of training and experience as established by the Department.

    b. If the inspection determines there are discrepancies between the system as installed and the proposed use, upgrades may be required prior to approval as a short term rental by this Department.

### 43.5 Site and Soil Evaluation

A. A site and soil evaluation must be conducted for each property on which an OWTS is proposed to determine the suitability of a location to support an OWTS, and to provide the designer a sound basis to select the most appropriate OWTS design for the location and application.

1. Each site evaluation must consist of:

    a. Preliminary investigation;

    b. Reconnaissance;

    c. Detailed soil investigation; and

    d. Report and site plan.

B. Preliminary investigation: Research of information relative to the site and anticipated conditions must be conducted. Information gathered as part of the preliminary investigation must include, but is not limited to:

1. Property Information:

    a. Address;

    b. Legal description;

    c. Existing structures; and

    d. Location of existing or proposed wells on the property.

2. Department records.

3. Published site information:

    a. Topography; and

    b. Soil data.

4. Location of physical features, on and off the property that will require setbacks as identified in Table 7-1.

5. Preliminary soil treatment area size estimate based on information on existing or planned facility and local regulations.

6. Other information required by the Department.

7. Additional information that may be useful to the specific evaluation as available:

    a. Survey;

    b. Easements;

    c. Floodplain maps;

    d. Geology and basin maps and descriptions;

    e. Aerial photographs;

    f. Climate information; and

    g. Delineated wetlands maps.

C. Reconnaissance: A visit to the property to evaluate the topography and other surface conditions that will impact the location and design of the OWTS must be conducted. Information gathered as part of the site reconnaissance may include, but is not limited to:

1. Landscape position;

2. Topography;

3. Vegetation;

4. Natural and cultural features; and

5. Current and historic land use.

Note: The reconnaissance evaluation may be conducted concurrently with the detailed soil investigation.

D. Detailed Soil Investigation

1. Soil investigations to determine the long-term acceptance rate of a soil treatment area must be conducted per the following criteria:

    a. Visual and tactile evaluation of two or more soil profile test pit excavations must be conducted to determine soil type as well as to determine whether a limiting layer is encountered.

b. In addition to the two soil profile test pit excavations, percolation testing may be conducted to obtain additional information regarding the long-term acceptance rate of the soil.

c. If the site evaluation includes both a visual tactile evaluation of soil profile test pit excavations and percolation tests, and the results from these two evaluations do not coincide with the same LTAR as noted in Table 10-1, the designer must use the more restrictive LTAR in determining the size of the soil treatment area.

2. Procedure for performing visual and tactile evaluations of soil in order to determine a long-term acceptance rate:

a. Evaluation of two or more soil profile test pit excavations must be performed by a professional engineer or by a competent technician under the supervision of a professional engineer to determine soil types limiting layers, and best depth for the infiltrative surface. The total number of soil profile test pit excavations beyond the required two shall be based on the judgment of the evaluator.

b. At least one of the soil profile test pit excavations must be performed in the portion of the soil treatment area anticipated to have the most limiting or restrictive conditions.

c. The minimum depth of the soil profile test pit excavation must be to any limiting layer, GROUNDWATER or four feet below the infiltrative surface of the in-situ soil, whichever is encountered first.

d. Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, any restrictive soil characteristic such as consistence, as defined by a cementation class, also needs to be evaluated.

(1) When cemented soils are encountered, the evaluation must identify the cementation class from rupture resistance as provided in table 5-1, “rupture resistance”.

(2) Per the “rupture resistance” table noted in item D.1 above, when the “cementation class” is identified within the soil profile as “strongly”, “very strongly cemented”, or “indurated” that layer will be classified as a “restrictive layer”.

(3) Note: Cemented soils will typically have characteristics of type 3A or 4A soils (table 10-1). Long term acceptance rates should coincide with the appropriate soil type classification or be adjusted to address the level of cementation.

e. The soil observations must be conducted at or immediately adjacent to the location of the proposed soil treatment area, but if possible, not under the final location of a trench or bed.

f. Each soil profile test pit excavation observed at the proposed soil treatment area must be evaluated under adequate light conditions with the soil in an unfrozen state.

g. The soil observation method must allow observation of the different soil horizons that constitute the soil profile.

h. Soil profile test pit observations must be conducted prior to percolation tests to determine whether the soils are suitable to warrant percolation tests and, if suitable, at what depth percolation tests must be conducted.

i. The soil type at the proposed infiltrative surface of the soil treatment area or a more restrictive soil type within the treatment depth (2-4 feet below infiltrative surface) must be used to determine the long-term acceptance rate from Table 10-1 or Table 10-1A. The treatment depth is two to four feet depending on the required thickness for the treatment level below the infiltrative surface from Item 4, Table 7-2.

j. Soils data, previously collected by others at the site can be used for the purposes of an OWTS design at the discretion of the Department. If the location of the system will be changed from the original soils report, at a minimum, an evaluation of a soil profile test pit excavation must be completed to confirm soil conditions.

3. Soil descriptions for determination of a limiting layer must include:

a. The depth of each soil horizon measured from the ground surface and a description of the soil texture, and structure of each soil horizon;

b. Depth to the bedrock;

c. Depth to the periodically saturated soil as determined by:

(1) Redoximorphic features and other indicators of seasonal or historic water levels, or

(2) Depth of standing water in the soil observation excavation, measured from the ground surface, if observed, unless redoximorphic features indicate a higher level.

4. Procedure for performing percolation tests:

a. Percolation testing shall be performed by a professional engineer or by a competent technician under the supervision of a professional engineer.

b. Number of test holes; Location

(1) Soil percolation tests shall be performed in at least three test holes in the area in which the soil treatment area is to be located, spaced evenly over the proposed area.

(2) If the likely depth of a proposed infiltrative surface is uncertain, percolation tests must be performed at more than one depth to determine the depth of the infiltrative surface.

c. Dimensions

(1) The percolation test hole must have a diameter of eight to 12 inches and be terminated a minimum of six inches and a maximum of 18 inches below the proposed infiltrative surface.

d. Change in Soil

(1) If a change of soil type, color or structure is present within those soils comprising the depth of soil below the infiltrative surface as required in Table 7-2 for vertical separation, a minimum of two soil percolation holes must be terminated in the changed soil, and percolation tests must be conducted in both holes.

e. Percolation Tests

(1) The percolation tests must be conducted using the hole preparation, soil saturation and rate measurement procedures described below.

(2) Preparation of Percolation Test Holes

(i) Excavate the hole to the depth and diameter required.

(ii) Carefully scrape the bottom and sides of the hole with a knife blade or sharp instrument to remove any smeared soil surfaces and provide a natural soil interface into which water may percolate.

(iii) Remove all loose soil from the hole.

(iv) Add two inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.

(3) Presoak

(i) The hole must be presoaked adequately to accomplish both saturation, which is filling the void spaces between the soil particles, and swelling, which is the intrusion of water into the individual soil particles.

(ii) To presoak the hole, carefully fill the hole with clean water to a minimum depth of 12 inches over the gravel placed in the bottom of the hole. In most soils, it is necessary to refill the hole by supplying a surplus reservoir of clean water, possibly by means of an automatic siphon, to maintain water in the hole for at least four hours and preferably overnight. Determine the percolation rate 24 hours after water is first added to the hole. This procedure is to ensure that the soil is given ample time to swell and to approach the condition it will be in during the wettest season of the year. IN TYPE 1 SOILS, (SAND AND LOAMY SAND; TABLE 10-1), the swelling procedure is not essential and the test may be conducted after the water from one filling of the hole has completely seeped out of the hole.

(4) Percolation Rate Measurement

(i) With the exception of TYPE 1 SOILS percolation rate measurements must be made on the day following the presoak procedure.

(ii) If water remains in the percolation test hole after the swelling period, adjust the depth to approximately six inches above the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level over a 30 minute interval. The drops are used to calculate the percolation rate.

(iii) If no water remains in the hole after the swelling period, carefully add clean water to bring the depth of water in the hole to approximately six inches above the top of the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level at 30 minute intervals for four hours, refilling to six inches over the top of the gravel as necessary. The drop in water level that occurs during the final

30-minute period is used to calculate the percolation rate. If the water level drops during prior periods provide sufficient information, the procedure may be modified to suit local circumstances. The requirement to conduct a four hour test under this section is waived if three successive water-level drops do not vary by more than 1/16 inch;

however, in no case shall a test under this section be less than two hours in duration.

(5) Sandy Soils

(i) In sandy soils or other soils in which the first six inches of water seeps out of the hole in less than 30 minutes, after the 24 hour swelling period, the time interval between measurements must be ten minutes and the test conducted for one hour. The drop that occurs during the final ten minutes must be used to calculate the percolation rate.

(ii) If the soil is so sandy or coarse-textured that it will not retain any water, then the infiltration rate must be recorded as less than one minute per inch.

(6) Special Soil Types

(i) The Department may identify soil types in the county for which different procedures such as extra presoaking or an extended testing time to obtain a valid percolation rate will be required.

(7) Percolation Rate Determination and Reporting

(i) The field percolation rate will be the average rate of the percolation rates determined for all percolation test holes observed in the proposed soil treatment area in minutes per inch. The average percolation rate determined by the tests must be used in determining the long-term acceptance rate for the proposed system from Table 10-1.

(ii) The technician performing the percolation tests shall furnish an accurate scale drawing, showing the location of the soil profile test pit excavations and/or percolation holes tied to lot corners or other permanent objects. The drawing must meet the criteria in section 43.5.F.1.g. The information in the subsections following section 43.5.F.1.g.1 through 43.5.F.1.g.5 may be included but is not required for this drawing. All holes must be clearly labeled to relate to the

information provided for the profile test pits and percolation tests.

(8) Alternate Percolation Testing

(i) Alternate percolation test procedures may be approved, provided the test results of alternate procedures are substantially equivalent to those determined using the test procedures described in this section.

(ii) Prior approval from the Department of alternate percolation test procedures is required.

E. Marking of Soil Profile Test Pit Excavations or Percolation Holes

1. The engineer or technician conducting the soil profile test pit excavations or percolation tests must, upon completion of the tests, flag or otherwise mark each excavation or hole to allow easy location by others. Soil profile test pit excavations and percolation holes must remain open until after evaluation by the Department.

2. The objective of the regulation is to ensure a detailed and accurate identification of the soils on each site, while concurrently ensuring the safety of the practitioner, general public and wildlife. In order to accomplish this, the following items are noted:

    a. In order to address public safety concerns, the regulatory intent is to backfill all soil profile test pits promptly after the soil evaluation is complete.

    b. The department requires a joint evaluation of the soils along with the engineer or competent technician.

    c. The department may identify additional requirements that require the installation of inspection ports in order to confirm that the elevation of an actual or seasonal water table (a groundwater condition) does not encroach on the vertical separation requirement to the proposed infiltrative surface of the soil treatment area

F. Report and Site Plan

1. A written report must describe the results of the preliminary investigation, reconnaissance, and detailed evaluations. The report may be in text and/or tabular form and must include a drawing locating features relative to the proposed OWTS location and test locations. The report may be included as part of the OWTS design document. The report must include, but is not limited to:

    a. Company name, address, telephone number, e-mail address, and name of individual, credentials and qualifications of the individual conducting the site evaluation;

    b. Preliminary and detailed evaluations, providing information from the surface site characteristics assessment and soils investigation;

    c. Dates of preliminary and detailed evaluations;

    d. A graphic soil log, to scale, indicating depth of the soil test pit excavation, soil description and classification, depth to any limiting layer encountered, type of equipment used to excavate the soil profile test pit and date of soils investigation.

    e. Setback distances to features listed in Table 7-1;

    f. Setback distances to features listed in Table 7-2, existing on the site or within applicable setback limits, whichever is greater;

    g. A drawing created to a scale that provides the complete property boundary lines. The minimum drawing size is 8.5-inches by 11-inches. If the property is too large to adequately indicate and label the profile test pits and percolation test holes, a detail of the portion of the site containing the soil profile test pits and percolation test holes must be submitted. If the property is too large to adequately show site evaluation information, a detailed drawing that includes the information required from the site and soil evaluation that will impact the location of the OWTS must be submitted. Drawings must indicate dimensions, have a north arrow and graphic scale and include:

(1) Fixed, non-degradable temporary or permanent benchmark, horizontal and vertical reference points of the proposed soil treatment area; soil observations; percolation testing results and pertinent distances from the proposed OWTS to all required setbacks, lot improvements, easements; ordinary high water mark of a pond, creek, stream, lake, wetland or other surface waters, and detention or retention ponds; and property lines;

(2) Contours or slope direction and percent slope;

(3) The location of any visible or known unsuitable, disturbed or compacted soils;

(4) The estimated depth of periodically saturated soils and bedrock, or flood elevation, if applicable; and

(5) The proposed elevation of the infiltrative surface of the soil treatment area, from an established datum (either ground surface or a benchmark);

h. Anticipated construction-related issues, if applicable;

i. An assessment of how known or reasonably foreseeable land use changes are expected to affect the system performance, including, but not limited to, changes in drainage patterns, increased impervious surfaces and proximity of new water supply wells, if applicable; and

j. A narrative explaining difficulties encountered during the site evaluation, including but not limited to identifying and interpreting soil and landform features and how the difficulties were resolved, if applicable.

G. Design Document

1. A design document must be provided for all systems. If required by section 43.10.B, the design document must be prepared by an engineer and may be attached to the report and site plan or be combined as a single document.

2. The design document must include a brief description of the facility and its proposed use, basis and calculations of design flow, and influent strength.

3. The design document must contain all plan details necessary for permitting, installation and maintenance, including:

a. Assumptions and calculations for each component, including total dynamic head (TDH) and gallons per minute (GPM) for all dosing systems;

b. A fixed, non-degradable temporary or permanent benchmark, (North America Vertical Datum or assumed elevation is acceptable);

c. A scale drawing showing location of each OWTS component and distances to water supplies, surface water, physical and health impact features on both the subject and adjacent properties requiring setbacks;

d. Layout of soil treatment area, dimensions of trenches or beds, distribution method and equipment, distribution boxes, drop boxes, valves, or other components used;

e. Contours or slope direction and percent slope for the area of the OWTS;

f. Elevation or depth of infiltrative surface of the soil treatment area, the septic tank invert, and all other components of the OWTS; for sites with minimal elevation change, providing the depth of the components from grade is acceptable. However, where the site has noticeable elevation changes, it is the expectation that the proposed elevations of all components, relative to a site benchmark, be provided.

g. Special structural design considerations, as applicable to ensure the long-term integrity of each component;

h. References to design manuals or other technical materials used;

i. Installation procedures, as applicable;

j. Operation and maintenance manuals or instructions; and

k. Other information that may be useful such as photos and cross-section drawings.

H. Site protection: Prior to and during construction, the proposed soil treatment area and replacement area, if any, must be protected from disturbance, compaction, or other damage by means of staking, fencing, posting, or other effective methods.

I. Qualifications for a Competent Technician

1. Percolation Tests

a. Competencies needed:

(1) Set up equipment;

(2) Perform and run percolation tests according to the procedure in this regulation; and

(3) Record results and calculate percolation rates.

b. The Department may approve training for percolation testing.

2. Visual and Tactile Evaluation of Soil

a. Competencies needed:

(1) Identify soil types by hand texturing and observation;

(2) Identify presence or absence of soil structure;

(3) Identify type and grade of soil structure;

(4) Identify soil consistence/cementation;

(5) Recognize evidence of highest seasonal water surface;

(6) Identify soil consistence/cementation;

(7) Determine the most promising depth for infiltrative surface of OWTS and for percolation tests, if used; and

(8) Understand basic principles of OWTS siting and design.

b. Possible demonstrations of competence in visual and tactile evaluation of soil:

(1) Degree in soil science, agronomy, geology, other majors if a course(s) in soil morphology was included; or

(2) Attendance at training or workshop for soil evaluation for OWTS including both class and field work.

(i) If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam must be attained.

c. The Division must approve training for visual and tactile evaluation of soil.

### 43.6 Wastewater Flow and Strength

A. Wastewater Flows

1. The Department may require the installation of a meter to measure flow into the facility or the OWTS.

2. Single-Family Residential Homes:

a. Design flow per person must be 75 gallons per day (gpd).

b. The Department may increase the wastewater design flow per person to 100 gpd on a case by case basis, where justified.

c. The minimum design flow for a new home must be for a two-bedroom house unless otherwise noted in this regulation. The minimum design flow for the repair or replacement of an OWTS of an existing one-bedroom home ~~or for new accessory dwelling units~~ may be for one-bedroom if the dwelling will remain as one-bedroom due to lot size or zoning restrictions.

d. For homes up to and including three bedrooms, the assumed number of persons per bedroom is two for design purposes.

e. For homes with more than three bedrooms, the assumed number of persons is six persons (first three bedrooms x two persons per bedroom) plus one additional person for each bedroom more than three bedrooms.

f. For residential dwellings used as a short term rental with a proposed occupancy of greater than 10, the minimum required design flow will be based on the maximum number of occupants at 75 gallons per person instead of the number of bedrooms.

g. Table 6-1 summarizes the design flows for single-family residential homes up to six bedrooms. The Department has authority to adjust these values as described in sections 43.6.A.2.b., 43.6.A.2.f.

3. Accessory Dwelling Units

a. An “accessory dwelling unit” is considered a smaller, independent residential dwelling located on the same lot or parcel as a stand-alone single-family home.

b. A new or expanded OWTS must be sized for the number of bedrooms proposed within the accessory dwelling unit.

4. Auxiliary Buildings

a. If a single-family home has an auxiliary building, such as a non-commercial shop with plumbing fixtures, the flow may be conveyed to the OWTS of the home, or to a separate OWTS constructed to handle the flow from the auxiliary facility.

b. If the flow from the auxiliary building is only generated by residents of the home, it will be assumed that the OWTS for the home will be adequately sized to include the auxiliary building if the flows are combined.

c. If the auxiliary building will have users in addition to residents and the flow from the auxiliary building will flow to the OWTS of the home, the design flow of the home must include the increased use.

d. If the auxiliary building has a separate OWTS, the facility must be sized on the basis of Table 6-2 and a septic tank detention time of 48 hours.

5. Multi-Family and Commercial On-site Wastewater Treatment Systems

a. Design flow values and strengths for multi-family and commercial systems must be determined from:

(1) Table 6-2; or

(2) An analysis of flows and strengths from at least three comparable facilities or from the facility, if it is an existing facility, must be submitted to the Department for approval. The analysis must include:

(i) Metered water flows for inside use only for at least a year, or if use is seasonal, for a full season. If metered flows are less than full capacity, they must be paired with actual use in units of persons present or meals served or other units as appropriate so that an actual daily rate per unit can be determined. The daily rate per unit times the number of units at full occupancy will be the design flow.

(ii) Total Suspended Solids and $BOD_5$ or $CBOD_5$ tests at times of full use. At least three samples taken at least one week apart are required. Sampling that provides equivalent and representative data through “composite sampling” may be allowed

(iii) Explanation and justification for the comparability of the tested facilities with the proposed facility.

(3) When a specific use is proposed which is not addressed within table 6-2, and where flow data from similar facilities is not available, the design document must provide reference to an alternate regulatory or industry standard for OWTS from where the proposed flow and water quality data was obtained. Estimates must include peak flows relative to full occupancy.

6. Flow Equalization

a. Flow equalization may be used if a facility has flows that vary from day to day by more than four times the average flow.

b. The highest peak assumed must be at least equal to the full capacity of the facility.

c. The stored flow must be distributed to the soil treatment area before the next greater-than-average peak.

d. Flow equalization may be used only if:

(1) The facility is non-residential;

(2) The facility is only used for one purpose;

(3) Flows will follow a predictable pattern; and

(4) There is a long-term expectation that size and pattern of the flows will remain the same.

e. Timed dosed pressure distribution or timed dosed NDDS must be used. The soil treatment area reduction for pressure distribution (Table 10-2) must not be used in addition to the flow equalization reduction.

f. Contingency plans must be made for expanding the capacity of the OWTS in the event of changed use at the facility.

B. Wastewater Strength

1. Table 6-3 includes levels of treatment that can be achieved by various OWTS components, excluding the soil treatment area. Systems qualifying for these treatment levels except TL1 produced by a septic tank alone, must be approved under section 43.13. of this regulation. If soil treatment area or vertical separation distance reductions are permitted, the Department must have a maintenance oversight program under section 43.14.D. in place.

2. High strength waste must be reduced to at least Treatment Level TL1 quality or lower before applying to a soil treatment area. Waste strength levels defined in Tables 6-3 and 6-4 must be used to determine compliance.

## 43.7 Minimum Distances Between Components of an On-site Wastewater Treatment System and Physical Features

A. Horizontal distances from the various components of a system to pertinent terrain features, including streams, lakes, water courses, springs, wetlands, wells, subsurface drains, cisterns, water lines, suction lines, dry gulches, cut banks, dwellings, other occupied buildings and property lines, must be in accordance with Table 7-1. The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher treatment levels as provided in Table 7-2. All distance setback modifications must be analyzed and approved by the Board of Health or Department and be in complete compliance with the variance procedures of this regulation and those of the Board of Health. Acceptable methods of analyzing horizontal separation distances with higher treatment levels include but are not limited to:

1. Analyzing the intended uses of impacted surface and/or ground waters;

2. Contacting adjacent property owners for potential conflicts with property line encroachments; and

3. Analyzing potential impacts that system locations may have on building foundations and other potentially affected features.

B. Reductions in separation distances with higher level treatment must include provisions for operation and maintenance for the life of the system, as described in section 14.D.

C. Dry Gulches, Cut Banks and Fill Areas

1. Separation distances to dry gulches, cut banks and fill areas in Table 7-1 must apply unless the designer or design engineer determines by observation of the exposed slope of the dry gulch or cut bank or by soil profile test pit excavations that a limiting layer is present that will direct or allow the effluent from the soil treatment area to move laterally and surface. In this instance, a greater distance may be required.

2. A lesser distance may be used if it can be demonstrated by a professional engineer or professional geologist that the use of a barrier, such as a minimum 30 mil PVC liner placed between the soil treatment area and the slope of the dry gulch, cut bank or fill area will prevent effluent surfacing laterally.

3. The separation distance between a component and the crest of a dry gulch or cut bank will be evaluated for potential erosion or slope instability if the component and the slope are too close together. If there is potential for erosion or instability, the separation distance must be increased until the risk is minimized.

D. Components of an OWTS listed in Table 7-1 MUST be installed or located in accordance with the minimum distance requirements provided in the table or such increased distances provided by Board of Health regulations.

1. A local board of health may choose to allow the local public health agency to permit the installation of an OWTS at a reduced property line setback in accordance with the following criteria:

a. If a property can accommodate the installation of an OWTS no closer than the required minimum 10-foot property line setback, it must do so. If the proposal complies with the requirements of this section and is deemed acceptable by the local public health agency, the local public health agency may administratively allow a reduction to the setback.

b. The property line setback must not be reduced to any less than 3 ft., unless a variance by the board of health is provided.

c. The property line setback encroachment must be proposed at the time of permit application and must include the following information:

(1) A statement from the applicant and/or designing engineer providing the reason for the reduced property line setback request.

(2) The applicant must demonstrate that the allowance of encroachment of the property line setback will not inhibit the development of surrounding properties (i.e. by allowing the encroachment of the property line setback, a neighboring property would not be able to meet the minimum setback requirement between the subject OWTS and a proposed adjacent well).

(3) The applicant must demonstrate that all activities associated with the installation of the proposed OWTS will not encroach on a neighboring property, and/or provide written permission from the adjacent owner or property manager of said property allowing the encroachment of machinery or excavated materials in order to install the proposed OWTS.

(4) The proposed OWTS must comply with all other required setbacks noted in table 7-1. The local public health agency approval of the encroachment must be for the referenced property line setback.

(5) the applicant must submit a survey of the property line(s) that the proposed setback encroachment will impact. The survey must include:

(i) A survey completed by a Colorado registered professional land surveyor in accordance with section 12-120-301 et seq., c.r.s.

(ii) A legal description and drawing of the subject property. Said drawing must also include the location of the proposed OWTS, onsite and adjacent wells.

(iii) The surveyor must clearly mark the surveyed property line(s) in a manner that is clearly defined and will not degrade over time due to exposure to the elements. The markings must remain in place until after system construction and final approval by the local public health agency.

d. Prohibitions

(1) Approval for an encroachment of the property line setback must not be after installation of the OWTS. Any post-construction reduction will require a variance by the board of health.

(2) A reduction in the setback to a property line may only be granted where a minimum separation of six feet between soil treatment areas on all adjacent properties is provided.

(3) The size of the soil treatment area must comply with section 43.10.c of reg. 43.

(4) Property line setback reductions are prohibited where multiple systems on the subject property are proposed and the combined capacity of the systems exceeds 2,000 gpd.

E. Table 7-2 provides the required site evaluation, design, and treatment level considerations necessary to evaluate the site and to design and locate the soil treatment area component of an OWTS.

1. Items 1, 2 and 3 in Table 7-2 address the allowable horizontal setback distance between the soil treatment area and the following physical features:

a. Setback distance from soil treatment area to on-site well;

b. Setback distance from soil treatment area to water features; and

c. Setback distance from soil treatment area to a dry gulch or cut bank.

2. Item 4 in Table 7-2 addresses the required vertical separation distance between the infiltrative surface of the soil treatment area and the limiting layer or the required depth of soil comprising the soil treatment area.

3. The designer may select the level of treatment from Table 7-2 to be applied to the soil treatment area that is necessary in order to accommodate the site conditions.

4. Sizing adjustments for use of the higher level treatment categories listed in Tables 7-2 and 10-1 will only apply provided the system is inspected and maintained as specified in the requirements of section 43.14.D, Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher Level Treatment.

F. When a system component must be placed on an adjacent property held under the same ownership as the owner of the dwelling, an easement allowing for future use and maintenance of the system must be prepared and recorded with the property through the Larimer County Clerk and Recorder prior to final approval of the system.

### 43.8 Design Criteria – General

A. The OWTS for single-family homes shall be designed to accommodate the proposed flows from the structure as defined in 43.6.A.2. Flow estimates for multi-family or commercial OWTS must comply with 43.6.A.4. Expected waste strength as noted in Table 6-3 and Table 6-4 must also be addressed, where applicable. Installation of low flow fixtures or the separation of toilet waste or other sources of wastewater does not allow for the reduction in the size of an OWTS.

B. OWTS shall be designed and constructed to achieve the treatment level specified by the design.

C. OWTS must be designed and constructed such that each component shall function, when installed and operated, in a manner not adversely affected by normal operating conditions including erosion, corrosion, vibration, shock, climatic conditions, and usual household chemicals. Each component must be free of non-functional protrusions or sharp edges, or other hazards, which could cause injury to persons, animals, or properties. Design must be such as to exclude flies and rodents and other vectors and to prevent the creation of nuisances and public health hazards and must provide for efficient operation and maintenance.

1. Spray-type foams that harden are not acceptable as a sealant for OWTS components.

D. Accessibility for Inspection, Maintenance, and Servicing

1. Septic tanks must have watertight risers over each access manhole. All risers must be a minimum of 20 inches inside diameter and extend to or above final grade, unless otherwise specified in this regulation.

2. For new construction, the top of any septic tank, dosing tank or vault must be no deeper than four feet below finished grade.

3. Each treatment component of an OWTS other than the septic tank and soil treatment area must be equipped with access manholes with risers that extend to or above final grade, located to permit periodic physical inspection, collection and testing of samples and maintenance of all components and compartments.

4. Riser Lids

a. Each riser lid must be watertight, brought to or above the surface, and must have a secure closing mechanism, such as a lock, bolts or screws, or sufficient weight (59 pounds or more) to prevent unauthorized access.

b. Access risers for all new septic tanks, seepage pits, or vaults, must include a structurally sound interior grate, or other similar secondary safety feature, securely installed below the tank lid to prevent persons, pets, or wildlife from falling into the tank.

5. Components that require access at or above grade for maintenance include but are not limited to; submerged bearings, moving parts, pumps, siphons, valves, tubes, intakes, distribution boxes,

drop boxes, cleanouts, effluent screens, filters, inlet and outlet baffles, aerators, treatment equipment and other devices.

6. Components must be designed and constructed so that, when installed, they may be easily maintained, sampled, and serviced according to the manufacturer's recommendations. Easy physical access to treatment components by maintenance personnel and equipment must be provided.

E. Plumbing Codes: Plumbing fixtures, building sewers, vents, sewer lines and other appurtenances must be designed, operated and maintained so as to comply with the minimum requirements of the most recently revised locally enforceable plumbing code. In absence of a local plumbing code, designs must adhere to the Colorado Plumbing Code (3 CCR 720-1). A local plumbing permit may be required.

F. Electrical Equipment, If Used

1. All electrical work, equipment, and material must comply with the requirements of the currently applicable National Electrical Code as designated by the State Electrical Board Rules and Regulations (3 CCR 710-1). A local electrical permit may be required.

2. Electrical components must be protected from moisture and corrosive gases.

3. An electrical disconnect must be provided within the line of sight of the chamber or component housing the pump.

G. Indicators of Failure or Malfunctioning for Systems Utilizing Mechanical Apparatus: A signal device must be installed which will provide a recognizable indication or warning to the user that the system or component is not operating as intended. This indication or warning must be a visual signal and an audible signal, and be located in a centralized area within visual and audible range of the system user. A signal or message may also be sent remotely to a maintenance provider.

H. Sampling Access

1. If sampling for testing or as a requirement for a permit will be required of effluent from a component other than the soil treatment area, an accessible sampling point must be provided.

2. If sampling of the treated wastewater from the soil treatment area will be required for testing or as a requirement for a permit, a monitoring well or wells must be constructed. Monitoring wells must be located down gradient from the soil treatment area, accessible, and provided with a properly securable cover at or above the ground surface. Monitoring wells up gradient of the system may also be required. Lysimeters or other collection devices under the soil treatment area may be used instead of a monitoring well if approved by the Department or other issuer of a permit.

I. Component Operating Instructions

1. The manufacturer of proprietary treatment units utilizing mechanical components must provide clear, concise written instructions covering the components which, when followed, must assure proper installation and safe and satisfactory operation and maintenance.

2. If the OWTS uses public domain technology, the design engineer must provide clear, concise written instructions covering the components which, when followed, must assure proper installation and safe and satisfactory operation and maintenance.

J. Surface Activity: Activity or use on the surface of the ground over any part of the OWTS must be restricted. The soil treatment area must not be subject to damage or soil compaction from livestock,

vehicular traffic, recreational use, or other site development activity. Construction equipment not necessary to install the OWTS must be kept off of the soil treatment area to prevent undesirable compaction of the soils. If compaction occurs, the disturbed or compacted soil must be re-evaluated and/or new soil evaluations performed. The system must be redesigned if the soil permeability has changed.

K. Floodplains

1. A new, expanded or repair/replacement OWTS installed in a 100-year floodplain must meet or exceed the requirements of the Federal Emergency Management Agency and the local emergency agency. OWTS installations in floodplain zones beginning with letters “a” or “v” are considered high-risk areas. Systems installed in these areas must be designed by a professional engineer. Repairs of an existing system must meet the requirements as feasible. The system as approved by the Department must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into the floodwaters. The OWTS must be located to avoid impairment to floodwaters or contamination from them during flooding.

2. A new or expanded OWTS must not be installed in a floodway designated in a 100-year floodplain where a conforming OWTS outside the floodway can be installed. For any new OWTS or system repair that may affect the floodway delineation, appropriate procedures must be followed including revision of the floodway designation, if necessary.

    a. Installations within a floodway requires a professional engineer to certify that an OWTS cannot be installed outside of the floodway.

    b. OWTS installations in a floodway must be designed by a professional engineer.

3. In order to comply with items 1 and 2 above, new and replacement OWTS installed in a 100 year floodplain shall obtain a Floodplain Development Permit from the Larimer County Floodplain Administrator in accordance with the requirements outlined in the Larimer County Land Use Code Floodplain Overlay Zone District, Section 4.2.2H. That regulation, as amended in November, 2013, requires that OWTS be designed and located to avoid impairment to them or contamination from them during flooding. Replacement OWTS in a designated floodway may also require a variance from the Larimer County Flood Review Board if the replacement system is proposed to be installed above grade and have the potential to cause a rise in the base flood elevation.

L. Business Commercial, Industrial, Institutional or Multi-Family Dwelling Wastewater Systems

1. An OWTS that will serve a business, commercial, industrial or institutional property, or a multifamily dwelling must:

    a. Be designed by a professional engineer;

    b. Receive only such biodegradable wastes for treatment and distribution as are compatible with those biological treatment processes as occur within the septic tank, any additional treatment unit and the soil treatment area. This does not include industrial, animal, or process waste; and

    c. Receive authorization by rule or a class V underground injection permit from the United States Environmental Protection Agency (EPA) before an application for an OWTS permit is approved if the system may receive non-residential wastewater or is otherwise covered by the EPA underground injection control program. Subsequent to acceptance by the EPA, the Department may choose to also issue a permit for this type of use.

## 43.9 Design Criteria – Components

A. Tanks and Vaults

1. Watertightness

   a. Septic tanks, vaults, dosing tanks, other treatment components, risers and lids must not allow infiltration of ground water or surface water and must not allow the release of wastewater or liquids through other than designed openings.

   b. When the final compartment of a tank is being proposed for use as a pump or siphon chamber, the wall between this chamber and the previous chamber must be watertight except for the intended hydraulic opening.

   c. Acceptable watertightness testing methods performed at a manufacturer's site or in the field include water filling the tank or vacuum testing.

2. Tank installation: all tanks are to be installed level, and placed on a uniform surface or bedding which does not contain rocks, roots or other items that could create point loading on the tank.

   a. If imported bedding is needed, common options include a 5" depth of compacted pea gravel or similar material.

3. Tank Anchoring: In locations where ground water or floodwaters may cause instability problems to the septic tank, vault, or other treatment unit in the OWTS due to flotation, the tank, vault or unit must be anchored in a manner sufficient to provide stability when the tank is empty. Risers must be included in the buoyancy calculations.

   a. If a manufacturer provides recommendations for anchoring designs, they may be used if they meet the conditions present at the site.

   b. If a manufacturer does not provide recommendations for provisions to compensate for buoyancy, or if the professional engineer chooses to provide his/her own designs, the anchoring system design must be prepared by the professional engineer.

4. Identification and Data Marking: All tanks and treatment units must be permanently and legibly marked in a location for the purpose of inspection that is readily visible when inspected before backfilling. The marking inscription must include the following:

   a. Name of manufacturer;

   b. Model or serial number, if available

   c. Effective volume and unit of measure;

   d. Maximum depth of earth cover and external loads the tanks is designed to resist; and

   e. Inlet and outlet identifications, if relevant.

B. Septic Tanks

1. The manufacturer must provide sufficient information to demonstrate that the tank will meet the design specification.

2. Sizing Requirements:

a. Sizing for residential capacity for new installations must be based upon the number of bedrooms according to Table 9-1 and 43.6.A.2:

b. For multi-family and non-residential applications, a septic tank must be sized to permit detention of incoming wastewater design flows for a minimum of 48 hours.

c. For systems that remove toilet waste for separate treatment, tank capacity may be less than 1,000 gallons, if it provides a minimum of 48 hours detention time.

d. Minimum tank size for new installations other than for a single-family residence is 400 gallons.

e. Where a grinder pump is installed prior to the septic tank, the required tank volume must be increased by at least 500 gallons above the required volumes provided in table 9-1.

f. If a proprietary aerobic treatment component is installed, the minimum septic tank (or trash tank) volume may be reduced to the volume as determined by the manufacturer. This volume will typically be provided on theCDPHE product acceptance document, which can be found on the CDPHE OWTS webpage.

3. Inspection and Testing of Septic Tank Watertightness

a. Testing of septic tanks must be performed and evaluated as specified in section 9 of ASTM C1227-13 (Standard Specification for Precast Septic Tanks) for concrete tanks or in Standard IAPMO/ANSI Z1000-2013 (American Standards for Prefabricated Septic Tanks) for other prefabricated septic tanks.

b. Each unit must be inspected in the field for conditions that may compromise its watertightness.

c. The inspection in the field must be conducted by the Department and be performed after the tank installation but before backfilling.

d. If the inspection in the field indicates that the tank may be damaged or is not watertight, the inspector may require that the tank be tested for watertightness by the tank manufacturer or the system contractor.

4. Septic Tank Design and Dimension Criteria

a. A septic tank must have two or more compartments or more than one tank may be used in series. The first compartment of a two-compartment tank or the first tank in a series must hold no less than one-half of the required effective volume.

b. Inlet invert must be at least two inches higher than the outlet invert.

c. Inlet tee or baffle must extend above the surface of the liquid at least five inches and must extend a minimum of eight inches below the liquid surface. However the inlet tee or baffle must not extend to a depth of more than 40 percent of the liquid depth measured from the liquid surface.

d. Outlet tee or baffle must extend at least 5 inches above and 14 inches below the outlet invert, however it must not extend to more than 40 percent of the liquid depth measured from the liquid surface. The outlet tee or baffle that accommodates an

effluent screen must be located so that the effluent screen has sufficient clearance to be removed through the access opening with a riser in place.

e. The distance from the outlet invert to the underside of the tank top must be at least ten inches.

f. Liquid depth must be a minimum of 30 inches and the maximum depth must not exceed the tank length.

g. The transfer of liquid from the first compartment to the second or successive compartment must be made at a liquid depth of between 35 and 40 percent of the liquid depth measured from the liquid surface.

h. At least one access opening no less than 20 inches across must be provided in each compartment of a septic tank.

i. A septic tank must have a minimum of 25 square feet of liquid surface area and have at least a six-foot separation between inlets and outlets. Septic tanks in series, combined, must have a minimum of 25 square feet of liquid surface area and the sum of the distances between inlets and outlets of all tanks must be at least six feet. The requirements for liquid surface area and separation between inlet and outlet may be waived for tanks with less than 750 gallon effective volume.

j. Tanks proposed to be located below vehicular traffic areas must have the appropriate aashto h-20 or hs-20 ratings for such use.

5. Concrete Septic Tank Structural Design

a. Concrete septic tanks must comply with the structural design criteria of ASTM C1227-13 (Standard Specification for Precast Septic Tanks).

b. The design for each tank model and size by each manufacturer must be certified by a professional engineer as complying with these design and structural requirements and the watertightness standard of this regulation.

c. Certification by a professional engineer must be submitted to the Division for acceptance.

d. Tank slab lids, mid-seam tanks, and the connections between the tank and risers must be designed to provide for a watertight seal.

6. Fiberglass, Fiberglass-Reinforced Polyester, and Plastic Tanks

a. All fiberglass, fiberglass-reinforced polyester, and plastic tanks must meet the minimum design and structural criteria of IAPMO/ANSI Z1000-2013 (American Standards for Prefabricated Septic Tanks) and be certified by a professional engineer as meeting these standards. The professional engineer certifying the criteria must be registered or licensed in the United States, but need not be registered in Colorado.

b. All tanks must be sold and delivered by the manufacturer or manufacturer's designated representative, preferably completely assembled. On-site tank assembly will be allowed on an as-needed basis.

c. Tanks must be structurally sound and support external forces as specified in the standard referenced above when empty and internal forces when full. Tanks must not deform or creep resulting in deflection of more than five percent in shape as a result of loads imposed.

d. All tanks must be constructed of sound, durable materials and not be subject to excessive corrosion, decay, frost damage, or cracking.

e. All seams or connections including to risers must be sealed to be watertight.

7. Metal tanks are prohibited.

C. Abandonment of Tank

1. A tank may be completely removed and the parts disposed of safely.

2. If the tank will remain in place:

a. The tank must be pumped to remove as much waste as possible;

b. The bottom of the tank must be broken so the tank neither floats nor fills with water;

c. The top must be collapsed and the sides may be broken into the void;

d. The remaining void must be filled with gravel, sand or compacted soil; and

e. The filled excavation will be graded to surroundings, allowing for settling.

3. The Department may require abandonment of a tank that is deemed to be a hazard.

D. Pipe Standards and Bedding Requirements

1. Pipe Standards

a. All wastewater pipes used in portions of an OWTS that are pressurized must be constructed of compatible pipe, primer, bonding agent, and fittings. Gasketed pipe is not approved for use in pressurized portions of a system.

b. Flexible couplings to connect pipes may only be used in portions of an OWTS that are intended for gravity flow of the wastewater. If flexible couplings are used to connect the exterior building sewer with the portion of the line exiting the foundation, they must be provided with shielding or a shear ring for additional stability and protection from settling.

c. The building sewer to, and the effluent line from the septic tank shall be laid with a minimum fall of 1/8 inch per foot (1/4 inch fall per foot is recommended) and shall be no less than four inches (4”) in diameter. The building sewer and effluent line shall be buried a minimum of one foot (1’) below grade.

d. Where unperforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034 or equivalent or greater strength. Schedule 40 pipe is preferred.

e. Perforated distribution pipe surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729 or equivalent or greater strength. Corrugated polyethylene pipe with a smooth interior that meets ASTM F405 or AASHTO M252 specifications or equivalent may be used.

f. Schedule 40 or pipe of equivalent or greater strength must be installed in the following places:

(1) Under driveways, roadways, or other areas where vehicular traffic is expected. Properly compacted select bedding material must be installed in such cases. additional frost protection, such as installing 2" foam board or double encasement of the pipe, is recommended.

(2) Five feet prior to and beyond all tanks; and

(3) In instances where sewer line setback distances are granted a variance for any reason.

g. Tile pipe, open-joint pipe, and cast iron pipe must not be used in an OWTS.

h. Pressure pipe must be rated for the intended use to accommodate pump discharge pressure cellular (foam) core piping must not be used in pressurized systems.

2. All system piping, except for distribution laterals within the soil treatment area, must be bedded using sand, pea gravel or squeegee, or loose on-site material free of rock, clods, frozen soil, and other debris before final inspection by the Department. Bedding material must be mechanically compacted to support piping.

3. When using pipe lengths that have spigot and bell ends on the building sewer, the pipes must be arranged such that the flow travels from the bell or socket end to the spigot end, with the bell ends facing upstream on each section of piping to prevent creating a lip which can catch material. The effluent pipe between the septic tank and soil treatment area is exempt from this requirement

E. Cleanouts Required Between the Building and the Septic Tank

1. Cleanouts must have a secure cap and a riser extending to or easily accessible from grade. The installation of a straight tee or sanitary tee is acceptable.

2. If a cleanout is not already provided outside of the building, a two-way cleanout, no smaller than the building sewer, must be installed between the building and the septic tank, as close to the home as practical, but at a distance no further than 50 feet of the outside wall. Local building codes may also apply.

a. For long runs of piping, building sewers must have a cleanout installed at intervals of not more than 100 feet.

3. Where a sewer has a change of horizontal direction greater than 45 degrees, a cleanout must be installed at the change of direction unless a cleanout already exists within 50 feet upstream of this fitting. where more than one change of direction greater than 45 degrees occurs within 50 feet of a developed length of piping, the cleanout for the first change of direction may serve as the cleanout for all changes within that 50 feet of developed length of pipe.

F. Distribution Box

1. A distribution box, if used, must be of sufficient size to distribute effluent equally to the laterals of a trench or absorption bed system. The box must be constructed with the inlet invert at least one inch above the level of the outlet inverts.

2. Flow equalizers or similar devices must be used to adjust the flow between laterals. Access to the box must be provided with a manhole riser with access lid at or above grade if the top of the box does not reach final grade.

3. Distribution box extension risers must not be used to provide the required access unless less than 24” in riser height is needed, or the risers are a minimum of 24” in diameter.

G. Drop Box

1. In sequential or serial distribution, a watertight box may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow to the next trench. A drop box shall have a riser or lid at or above final grade.

2. Outlet pipes in sequential distribution must be designed and installed so that they may be capped off for resting periods.

H. Stepdown/Relief Pipe: In sequential or serial distribution, an unperforated pipe may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow from that trench.

I. Wastewater Pumping and Dosing Siphon Systems

1. Dosing Tank Sizing

a. Tanks or tank compartments used for dosing a pressure distribution system with a pump must have a minimum volume equal to the following:

(1) One design dose volume, plus;

(2) Drain-back volume (if applicable), plus;

(3) One third of the daily design flow, plus;

(4) Volume of the tank located below the pump inlet.

b. Tanks used for dosing must be protected from freezing by being buried deep enough to place the pump below frost depth and have all discharge piping drain between doses or be buried below frost depth. The top of the dosing tank must be no deeper than four feet below finished grade.

2. Pumps

a. Non-clog pump opening must have at least two-inch diameter solids handling capacity where raw wastewater is pumped. A pump opening must not have more than 3/4-inch diameter solids handling capacity if previously settled effluent is pumped.

b. Pumps must be certified to the applicable UL or CSA electrical safety standard, bear the seal of approval of CSA, UL or an equivalent testing program and be constructed of corrosion resistant materials.

c. Grinder pumps must also be certified to NSF/ANSI Standard 46 and bear the seal of approval of the NSF or equivalent testing and certification program.

(1) Where a grinder pump is used prior to the septic tank, an effluent filter is required to be installed on the outlet of the septic tank. Additional tank requirements are provided in section 43.9.B.2.E.

(2) Where a grinder pump is used prior to the septic tank, the effluent pipe from the grinder pump must be connected to the sewer line prior to the inlet of the septic tank.

3. Floats and Switches

a. Automatic liquid level controls must be provided to start and shut off pumps at a frequency or level specified in the design.

b. Floats must be mounted on a stem separate from the pump discharge piping to allow for removal, adjustment, and replacement of the float from grade without removing the pump. Components used to hold the floats must be securely attached and of a material that is resistant to corrosion and will not absorb water.

c. Float switches must be certified to the applicable UL or CSA electrical safety standard, bear the seal of approval of CSA, UL or an equivalent certification program and be constructed of corrosion resistant materials.

d. Dosing siphons for pressure dosing and higher level treatment systems must provide for a means of determining the number of dosing events.

4. Location of Pump or Siphon

a. A pump or a siphon may be installed in a separate tank following the septic tank. The tank must be of sufficient volume to allow pump or siphon cycling commensurate with the design capacity.

b. The second compartment of a two-compartment septic tank may only be used as the pump tank when the tank is specifically designed for this purpose and it can be demonstrated to the satisfaction of the Department that the minimum 48-hour detention time will not be decreased. The pump must be screened to remove solids greater than 1/8" to assure that only liquid effluent will be discharged. The transfer of liquid from the first to the second compartment must be at an elevation that is between the inlet and outlet invert elevations, and through a standard tee designed and located as per the requirements of section 43.9.B.4.d. Siphons must not be installed in the second compartment of a two compartment tank.

c. The use of a three-compartment septic tank, sized to provide the required effective volume in the first two compartments with the pump or siphon in the third compartment is acceptable for tanks specifically designed for this purpose. The transfer of liquid from the second to the third compartment must be at an elevation that is between the inlet and outlet invert elevation, and through a standard tee designed and located as per the requirements of section 43.9.B.4.d.

5. Pump or Siphon Discharge Piping

a. The discharge pipe from the pumping or siphon chamber must be protected from freezing by burying the pipe below frost level or sloping the pipe to allow it to be self-draining. Drainage must be provided through the bottom of the pump or through a weep hole located in the discharge pipe prior to exiting the tank.

b. The pump discharge piping must have a quick disconnect or union located within 18" of the access riser lid to allow for easy pump access and removal.

c. The pipe must be sized to maintain a velocity of two or more feet per second.

d. Pressure pipes must be designed to prevent air or vacuum locking and allow self-draining of the pipes.

6. Access

a. The pump or dosing system tank, chamber, or compartment must have a minimum 24-inch nominal diameter access riser, made of corrosion-resistant material, extending to or above ground level. A smaller diameter riser may only be installed if it is accepted by the Division as an integral component of a specific product during the product review process.

b. The access riser must have a watertight connection to the pump or dosing chamber/compartment to prevent infiltration or exfiltration. All other intrusions to the riser for electrical or other component access must also be watertight.

7. Junction Box

a. Electrical junction boxes must be located outside the pump system or septic tank access risers and be accessible from the ground surface. Wire penetrations from the interior of the riser to conduit or a junction box on the outside of the riser must be sealed.

b. Wire splices are prohibited inside the tank, dosing chamber or riser. Wire splicing must be completed with corrosion-resistant, watertight connectors.

8. Controls

a. Control panels or other electrical boxes used to control the functions of an OWTS must comply with the following, as appropriate:

(1) The pump system must have an audible and visual alarm notification in the event an excessively high water condition occurs.

(2) The pump must be connected to a circuit breaker separate from the alarm breaker and from any other control system circuits.

(3) An electrical disconnect must be provided within the line of sight of the pump chamber.

(4) The pump system must be provided with a means that will allow the pump to be manually operated; such as an H.O.A. switch (Hand/Off/Auto).

(5) The pump system for pressure dosing and higher level treatment systems must have a mechanism for determining both the amount of time the pump runs and the number of cycles the pump operates.

(6) Must bear the seal indicating acceptable product testing from a U.S. Department of Labor, Occupational Safety and Health Administration Nationally Recognized Testing Laboratory (NRTL) (https://www.osha.gov/dts/otpca/nrtl/nrtllist.html), such as UL or ETL.

(7) The bottom of the control panel must be at least 30 inches above grade.

J. Effluent Filters

1. When effluent filters are required, the septic tank outlet, or the outlet of the last septic tank in series, must include an effluent filter that retains solids greater than one-eighth inch in size. Effluent filters must be sized to meet the estimated daily design flow and waste strength.

2. If a pump or dosing siphon is used to remove septic tank effluent from the final compartment of the septic tank or from a separate dosing tank, the effluent must be filtered prior to dispersal into the soil treatment area through use of an outlet tee effluent screen, pump vault equipped with a filter cartridge, or a filter on the discharge pipe.

3. The effluent filter must be cleaned at manufacturer-recommended intervals, or more often, if use patterns indicate.

4. An alarm may be installed on an effluent filter indicating need for maintenance.

5. Where an ejector pump, grinder pump or non-clog pump is proposed for use prior to the septic tank, an effluent filter must be installed on the outlet of the septic tank.

6. The handle of the effluent filter must extend to within 12 inches of the access riser lid.

K. Grease Interceptor Tanks

1. All commercial food service facilities and other facilities generating fats, oils and greases in their waste must install a grease interceptor tank. The tank must be located outside of the structure and be a concrete, plastic, or fiberglass tank that meets the requirements of 43.9.A & B with baffles or tees per requirements of 4 & 5 below.

2. Grease interceptor tanks shall treat only those portions of the total wastewater flow in which grease and oils are generated.

3. The grease interceptor must have a minimum of two compartments and must be sized proportionate to the amount of fats, oils and grease it receives, the peak flow rate through the tank, and the expected cleaning frequency.

4. The inlet and outlet tees or baffles must extend into the bottom 1/3 of the liquid volume, but must be at least 12 inches off the inside floor of the interceptor.

5. The inlet and outlet tees or baffles must extend at least 5 inches above the liquid level and must provide for a free vent area across the liquid surface.

## 43.10 Design Criteria – Soil Treatment Area

A. The size and design of the soil treatment area must be based on the results of the site and soil evaluation, design criteria, and construction standards for the proposed site and OWTS selected.

B. At proposed soil treatment area locations RECEIVING DOMESTIC WASTEWATER, where any of the following conditions are present, the OWTS must be designed by a professional engineer and approved by the Department:

1. For OWTS installed in soil types 3A, 4, 4A, 5, R-0, R-1 and R-2, and Treatment Levels TL2, TL2N, TL3, and TL3N as specified in Tables 10-1 and 10-1A of this regulation;

2. For OWTS that include components which provide treatment levels TL2, TL2N, TL3, TL3N and TL3ND effluent; or an NDDS;

3. The maximum seasonal level of the ground water surface is less than four (4) feet below the bottom of the proposed infiltrative surface;

4. WHERE A limiting layer, RESTRICTIVE LAYER, OR GROUNDWATER CONDITION exists less than four (4) feet below the bottom of the proposed infiltrative surface;

5. In floodplains or floodways, as required in section 43.8.K

6. The ground slope is in excess of thirty percent;

7. Pressure distribution is used;

8. In environmentally sensitive areas as described in 43.11.A.3.

9. OWTS for business, commercial, industrial, institutional use, or multi-family dwellings.

C. Calculation of Infiltrative Surface of Soil Treatment Area

1. The infiltrative surface of a trench or bed receiving any treatment level of effluent is only the bottom area. No sidewall credit is allowed except in deep gravel trenches and seepage pits that are permissible in repairs.

2. Long-term acceptance rates (LTARs) are shown in Tables 10-1 and 10-1A.

3. Factors for adjusting the size of the soil treatment area are in Tables 10-2 and 10-3.

4. The required area for a soil treatment area is determined by the following formula:

$$\textit{Soil Treatment Area in Square Feet Required} = \frac{\textit{Design Flow (in gallons per day)}}{\textit{LTAR (in gallons per day per square foot)}}$$

   a. Adjusted Soil Treatment Area = Required Soil Treatment Area x Size Adjustment Factor(s).

   b. Size adjustment factors for methods of application are in Table 10-2.

   c. Size adjustment factors for types of distribution media are in Table 10-3.

   d. A soil treatment area receiving TL1 effluent may be multiplied by one size adjustment factor from Table 10-2, Table 10-3, or both.

   e. The distribution media options within table 10-3 may be used for distribution of higher level treatment system effluent (tl2 – tl3nd), however, the size reduction factors within table 10-3 must not be used. Sizing reductions for higher level treatment systems are achieved through increased LTAR's provided in table 10-1 and may only be used in locations where the local public health agency implements a maintenance oversight program as defined in section 43.14.D.

5. A soil treatment area receiving TL2, TL2N, TL3, or TL3N or TL3ND effluent must be pressure dosed.

   a. For products that combine distribution and higher level treatment within the same component, pressure distribution of the effluent over the soil treatment area must be used.

   b. TL2 – TL3ND effluent may be applied by gravity flow in soil types 3, 3A, 4 for designs where reductions in the soil treatment area size or vertical/horizontal separation reductions are not being requested.

D. Allowable Soil Treatment Area Sizing Adjustments:

1. The soil treatment area size determined by dividing the design flow rate by the long-term acceptance rate may be adjusted by factors for method of treatment, soil treatment area design, and type of distribution media.

2. For the purpose of Table 10-1, a "baseline system," i.e. adjustment factor of 1.00, is considered to be Treatment Level 1 (TL1) applied by gravity to a gravel-filled trench.

3. Sizing adjustments are not allowed for systems placed in type “r” soils. The maximum LTAR’s are provided in section 43.11.C.3.B.

4. Long Term Acceptance Rates for use of the higher level treatment categories listed in Tables 10-1 will only apply provided the system is inspected and maintained as specified in the requirements of section 43.14.D, Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher Level Treatment.

E. Design of Distribution Systems

1. General

a. The infiltrative surface and distribution laterals must be level.

b. The infiltrative surface must be no deeper than four feet below grade unless TL2 or higher effluent is applied to the distribution media and the system is inspected and maintained as specified in the requirements of section 43.14.D. The depth of the infiltrative surface will be measured on the up-slope side of the trench or bed.

c. Where a conforming soil treatment area is reasonably accessible, the soil treatment area must not be placed below a paved surface, or an area where vehicular traffic occurs or is expected. If a compliant site for the soil treatment area cannot be identified, it may be placed below a paved surface when all of the following conditions are met:

(1) The effluent must be treated to tl2 or higher prior to being applied to the distribution media.

(2) The distribution system must be designed to accommodate the vehicular loading.

(3) Size adjustment factors identified in table 10-3 must not be applied

d. Trenches must follow the ground surface contours so variations in infiltrative surface depth are minimized. Beds must be oriented along contours to the degree possible.

e. Pipe for gravity distribution must be no less than three inches in diameter.

f. A final cover of soil suitable for vegetation at least ten inches deep must be placed from the top of the geotextile or similar pervious material in a rock and pipe system, chamber, or manufactured media up to the final surface grade of the soil treatment area. The backfill material must be void of cobbles, boulders, building debris, or other non-permeable material. The preferred soil cover is a sandy loam textured material, topped with two – three inches of topsoil.

g. Following construction, the ground surface must be graded to divert stormwater runoff or other outside water from the soil treatment area. The area must be protected

against erosion. Subsurface drains upslope of the soil treatment area may be installed to divert subsurface flow around the area.

h. Backfilling and compaction of soil treatment areas must be accomplished in a manner that does not impair the intended function and performance of the storage/distribution media and soil and distribution laterals, allows for the establishment of vegetative cover, minimizes settlement and maintains proper drainage.

i. Dosing may be used for soil treatment area distribution. The dose must be sized to account for the daily flow and the dosing frequency.

2. Distribution Laterals; Must meet the requirements of section 43.9.D as applicable.

a. Distribution between laterals in a soil treatment area must be as level as possible. Uneven settling of portions of the distribution system following construction must be addressed by provisions in the design to adjust flows between laterals.

b. The maximum length of distribution laterals for gravity distribution must not exceed 100 feet. Distribution laterals may be up to 150 feet if pressure dosed or if the application of the effluent is made at the center of the lateral through a distribution box.

c. For absorption beds, the separating distance between parallel gravity distribution laterals must not exceed six feet (center-to-center), and a distribution lateral must be located within three feet of each sidewall and endwall.

d. The end of a distribution pipe must be capped, unless it is in a bed or trenches in a level soil treatment area, where the ends of the pipes may be looped.

e. To promote equal distribution to the soil treatment area, the forcemain or effluent pipe ON GRAVITY FLOW SYSTEM must be connected to as near to the middle of the distribution header as possible. However it must be offset from any distribution lateral. So as to not provide a direct pathway into a single lateral. note that the installation of a distribution box with flow levelers is preferred, as this will further assist in better distribution of the effluent.

f. Orifices must be oriented downward unless pressure distribution is used and provision for pipe drainage is included.

3. Pressure Distribution

a. Design of PLAN FOR pressure distribution systems must identify the exact specifications for the following items:

(1) General design parameters: not all combinations of the variables noted below will result in a proper distribution system design. The design engineer must justify through calculations &/or design software that the selected values will concur with the requirements noted below.

(i) Distribution pipe size: 3/4 inch – 1.5 inches (pvc class 200, min.). 2-inch distribution pipe may only be used where other design modifications cannot overcome a greater than 10% variation in the pressure head between the initial and distal orifices.

(ii) Distribution pipe spacing: 18 inches – 48 inches

(iii) Orifice size: 1/8 inches – 3/8 inches

(iv) Orifice spacing: 18 inches – 48 inches

(v) Proposed dose volume: will vary with design (0.25 – 1.0) gallons/orifice/dose, or 3 - 5 times distribution pipe volume

(vi) To promote equal distribution within the soil treatment area, the forcemain within a pressure distribution system must be connected to as near to the middle of the distribution header as possible. This connection must be offset from any distribution lateral to prevent preferential flow to a single lateral. An allowable alternative to this configuration is provided below:

a) Connections to the end of the distribution header are only allowed for soil treatment areas having a width of 12' or less, and no more than 4 laterals. for such configurations, a minimum 2"diameter manifold is required.

(vii) Operating head at the distal end of distribution pipes:

a) For systems with orifices 5/32 inch or less, the minimum squirt height is five feet.

b) For systems with orifices 3/16 inch or greater, the minimum squirt height must be at least 12 inches above final grade, but never less than 30 inches above the lateral invert

c) As part of the final inspection of an OWTS installation with pressure distribution, a residual head test (squirt height), at the distal end of each lateral, must be conducted to determine the adequacy of system design and construction. Results from this inspection must be included within both the engineer's certification and the final permit acceptance documents.

(2) Pump/siphon information; total dynamic head; gallons/minute;

(3) Drain-back volume from transport line to manifold/valve; and

(4) Calculations, or a design software reference, that indicates the selected component sizing will provide equal flow within each active zone of the distribution system, and provide no more than a 10% flow differential from the initial orifice to the most distal end orifice within each zone.

b. The separating distance between parallel distribution pipes in a pressure distribution absorption bed must not exceed four feet, and the outer distribution pipe must be located within two feet of each sidewall and endwall. Specific requirements for the design of sand filters are noted in section 43.11.C.2.

c. Flushing assemblies must be installed at the distal end of each lateral and be accessible from finished grade. A sweeping 90 degree or bends limited to 45 degree must be provided.

d. Effluent must be screened to retain solids 1/8" or greater prior to dosing a pressure distribution system. An effluent filter may be installed at the tank outlet, or within a

screened pump vault. The filter may also be installed within the discharge line, inside the pump chamber.

F. Soil Treatment Area Requirements

1. Trenches

a. Trenches must be three (3) feet wide or less.

b. The separating distance between trenches must be a minimum of four (4) feet sidewall-to-sidewall.

c. Distribution laterals used in a trench must be as close to the center of the trench as possible.

2. Beds

a. Maximum width for a bed must be 12 feet, unless the bed receives effluent meeting Treatment Level 2 quality or better.

b. The separating distance between beds must be a minimum of six feet sidewall-to-sidewall.

3. Serial and Sequential Distribution:

a. New serial distribution systems, where the effluent must pass through the first trench in order to access subsequent trenches, are prohibited.

a. A sequential distribution system may be used where the ground slope does not allow for suitable installation of a single level soil treatment area unless a distribution box or dosing chamber is used.

b. The horizontal distance from the side of the absorption system to the surface of the ground on a slope must be adequate to prevent lateral flow and surfacing.

c. Adjacent trenches or beds must be connected with a stepdown/relief pipe or a drop box arrangement such that each trench fills with effluent to the top of the gravel or chamber outlet before flowing to succeeding treatment areas. Note that in a sequential distribution configuration, effluent does not pass through the first trench before it enters subsequent trenches.

4. Alternating Systems

a. An alternating system must have two or more zones that must be alternated on an annual or more frequent basis.

b. For repairs, each section must be a minimum of 50 percent of the total required soil treatment area. For new installations, each separate soil treatment area must meet the minimum sizing requirements of this regulation.

c. A diversion valve or other approved diversion mechanism that requires the owner or operator to manually alternate zones of the OWTS may be installed on the septic tank effluent line allowing soil treatment area sections to be alternated.

d. The diversion mechanism must be readily accessible from the finished grade.

5. Sequencing Zone Systems

a. Sequencing zone systems have two or more soil treatment area sections that are dosed on a frequent rotating basis.

b. Where soil conditions are similar between the sections, each section area must be the same size. If soil conditions are such that long-term acceptance rates are different, each section may be sized for the same dose, but different long-term acceptance rates.

c. An automatic distribution valve must be used. Flow rate calculations must be included in the design to ensure the pump can provide the minimum required rate required to activate the valve per manufacturer's specifications.

d. Dosing of each system must be evaluated by the design engineer based on projected daily flow rates, number of zones, and soil types.

6. Inspection Ports

a. A 4-inch inspection port accessible from ground surface must be installed at the terminal end of each lateral in a trench system and at each corner of a bed system. The bottom of the inspection port tube must extend to the infiltrative surface and not be connected to the end of a distribution pipe.

b. Inspection ports in chambers may be installed according to manufacturer's instructions if the infiltrative surface is visible and effluent levels can be observed from the inspection port.

c. Additional inspection ports connected to distribution pipes may be installed.

d. The top of inspection ports may be terminated below the final grade if each is housed in a component such as a valve box for a lawn irrigation system and has a removable cover at the ground surface.

e. Perforations/slots in the inspection ports of a rock and pipe installation shall be provided from near the base of the pipe, and extending to at least eight inches above the infiltrative surface. Multiple slots or orifices must be provided.

G. Storage/Distribution Media

1. Rock and Pipe

a. The perforated pipe must be surrounded by clean, graded gravel, rock, or other material of equal efficiency which must range in size from $^{1}/_{2}$ inch to 2 $^{1}/_{2}$ inches. AASHTO M 43 size No. 3 coarse aggregate meets this specification. Gravel should have no more than one percent by weight passing a No. 200 sieve. Crushed limestone, sandstone, asphalt, or other materials that easily break down over time are not approved.

b. At least six inches of gravel, rock or other material must be placed below the pipe. The gravel, rock or other material must fill around the pipe and be at least two inches above the top of the distribution pipe.

c. The top of the placed gravel or such material used must be covered with non-woven permeable geotextile meeting a thickness rating of 2.0-5.0 ounces per square yard or equivalent pervious material. An impervious covering must not be used.

2. Chambers

   a. Chambers must be installed with the base of the unit on in-situ soil or, if placed on acceptable media, the manufacturer's installation instructions must be followed so as to prevent chambers from settling into the media.

   b. Effluent pipes from the distribution box or manifold must enter the chamber at least six inches above the base of the chamber on standard height chambers, and at least 3 inches above the base of the chamber on the low profile models

   c. Installation must be according to manufacturer's instructions.

   d. Effluent may be distributed by gravity, pump or siphon.

   e. As per section 43.13.E.1.D, if the total area covered by chambers is at least 90 percent of the excavated area, it may be approved as being the equivalent square footage of the total excavation.

      (1) The area below the chamber endcaps must not be included in the calculations of the soil treatment area.

3. Media, Enhanced, or Other Manufactured

   a. Manufactured media must be installed with the base on the in-situ soil or placed on acceptable media meeting the manufacturer's specifications for proprietary distribution products or combined treatment/distribution products.

   b. Installation must be according to manufacturer's instructions.

   c. Pressure distribution is required for TL2-TL3N effluent, unless otherwise noted in this regulation.

4. DRIP DISPERSAL SYSTEMS

   a. The infiltrative surface area must be calculated using the long-term acceptance rate for the site or a more conservative value if recommended by the manufacturer. adjustment factors in tables 10-2 and 10-3 may not be used.

   b. Driplines must be installed on manufacturer's spacing recommendations.

   c. Drainback must be provided for all drip lines, pipes and pumps.

   d. Provisions must be made to minimize freezing in the distribution pipes, driplines, relief valves, and control systems.

   e. Provisions must be made for filtering, back-flushing, or other. Required cleaning maintenance.

5. Tire Chips

   a. The pipe may be surrounded with clean, uniformly-sized tire chips.

   b. Tire chips must be nominally two inches in size and may range from ½ inch to a maximum of four inches in any one direction.

   c. Wire strands must not protrude from the tire chips more than 0.75 inches.

d. Tire chips must be free from balls of wire and fine particles less than two mm across.

e. The top of the tire chips used must be covered with non-woven permeable geotextile meeting a thickness rating of 2.0-5.0 ounces per square yard or equivalent pervious material. An impervious covering must not be used.

H. Soil Replacement Systems

The construction of a soil replacement system is permitted to bring the soil treatment area into compliance with the requirements of this regulation.

1. When a soil type “R” is removed, the following requirements must be met:

   a. All added soil must comply with the following specifications:

      (1) Added soil must meet the specifications of imported treatment sand media, as specified in section 43.11.C.2.

      (2) The long-term acceptance rates as specified in 43.11.C.3.B must be used. No additional sizing adjustments are allowed.

      (3) The depth of the added media must comply with the requirements of Table 10-1A.

         (i) In order to utilize the reduced vertical separation requirements for TL2 or higher quality effluent, the Department must have a program for inspection and oversight as specified in section 43.14.D.4.

      (4) All added soil must be completely settled prior to installation of components as specified and approved by the design engineer.

      (5) Pressure distribution must be used.

2. When a sand media is added to soil treatment area or to an excavation where a soil type 1-5 (Table 10-1) is the underlying soil, the following requirements must be met:

   a. Added soil must meet the specifications of either imported treatment sand media, as specified in section 43.11.C.2.d.

   b. Unless the design follows the criteria for a sand filter or mound system design where ≥24 inches of sand is installed as required in section 43.11, or a higher level treatment system has been installed and the local public health agency implements an maintenance over sight program as provided in section 43.14.d, the TL1 long-term acceptance rate of the most restrictive soil within 12” below the sand base must be used.

   c. For sites where the proposed soil treatment area had been previously filled, the existing fill material must be removed and replaced with imported treatment sand meeting the specifications of section 43.11.c.2.d. the excavation must also extend at least 12” below the original grade (grade prior to fill). only existing fill material meeting the requirements of a soil type 1 will be allowed to remain.

   d. All added soil must be completely settled prior to installation of components.

I. Repairs

1. When space is not available or if there are site limitations that preclude other soil treatment area options for OWTS repairs, wide beds, deep gravel trenches, deep beds and seepage pits may be considered for repairs only. Other options are vaults or higher level treatment systems.

2. Repairs to failing systems must conform to setbacks identified in Table 7-1 when possible. When this is not possible using all available methods described above, the jurisdiction with authority may permit reductions to setbacks. At no point will a setback reduction be approved by the jurisdiction less than what the existing separation is to existing OWTS. In maximizing this setback distance, all methods available in section 43.10.I.1 must be utilized including but not limited to the use of Higher Level Treatment, wide beds, seepage pits, etc., where allowed. Any setback reduction beyond what the existing failing system presents must be approved by the Board of Health as outlined in section 43.4.L.

3. soils information obtained for the previous OWTS installation may be used if the information meets the requirements of section 43.5.D.2.J. otherwise, an additional soils investigation will be required

4. Wide Beds: For repairs, beds may be wider than 12 feet without being required to receive effluent meeting Treatment Level 2 quality or better.

5. Deep Beds: For repairs, the infiltrative surface of a bed may be no deeper than five feet. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied. System sizing will be based strictly on the soil type and corresponding LTAR.

6. Deep Gravel Trenches

    a. Deep gravel trenches may only be installed in soil typE 1, 2, 2A, AND 3. installations in soil type 3A, 4, 4A and R are prohibited.

    b. The length of an absorption trench may be calculated by allowance for the sidewall area of additional depth of gravel in excess of six inches below the bottom of the distribution pipe according to the following formula:

$$\text{Adjusted Length} = L \times \frac{(W+2)}{(W+1+2D)}$$

Where:

L = length of trench prior to adjustment for

deep gravel W = width of trench in feet

D = additional depth in feet of gravel in excess of the minimum required six inches of gravel below the distribution pipe

    c. Vertical separation requirements provided in table 7-2 must be met.

    d. Maximum allowable additional depth is five feet.

    e. Evaluation of tests or soil profile test pit excavations or percolation tests must be performed at the proposed infiltrative surface depth.

    f. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied to deep gravel trenches.

7. Seepage Pits

a. For repairs, a seepage pit without higher level treatment may be used if the site can meet all required horizontal and vertical setbacks of Tables 7-1 and 7-2. Construction of seepage pits for new systems is prohibited.

b. If setbacks in Tables 7-1 and 7-2 cannot be met, higher level treatment of at least TL2N must be attained prior to discharge to a seepage pit.

c. Reductions in the vertical, horizontal separation or system sizing requirements for the use of higher level treatment systems with seepage pits are not allowed.

d. A seepage pit must consist of a buried structure of precast perforated concrete, or cinder or concrete block laid dry with open joints.

(1) Pits must be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.

(2) The excavation must be larger than the structure by at least 12 inches on each side and may not exceed 5 feet beyond the structure wall.

(3) The over-excavated volume must be filled with clean, graded gravel or rock, which may range in size from ½ inch to 2 ½ inches. AASHTO M 43 size No 3 coarse aggregate meets this specification.

(4) The capacity of the pit must be computed on the basis of long-term acceptance rates determined for each stratum penetrated. The weighted average of the results must be used to obtain a design figure.

(5) Soil strata in which the percolation is slower than 30 minutes per inch must not be used for absorption or seepage. These strata must not be included in the weighted average to determine the long-term acceptance rate.

(6) The infiltrative surface of the pit is the vertical wall area (based on dug perimeter) of the pervious strata below the inlet plus the bottom of the excavated area.

(7) The bottom of the pit excavation must be greater than four feet above a limiting layer, restrictive layer, or groundwater condition.

e. Pits must be separated by a distance equal to three times the greatest lateral dimension of the largest pit. For pits over 20 feet in depth, the minimum space between pits must be 20 feet.

8. Vaults

a. Criteria for vaults are in section 43.12.B of this regulation.

9. Higher Level Treatment Options

a. Reduction in required soil treatment area for repairs is possible with higher level treatment only where the Department meets the requirements of section 43.14.

b. Design criteria for higher level treatment systems are in section 43.11.

10. Wastewater Ponds

    a. Construction of new wastewater ponds is prohibited.

11. Remediation Systems

    a. The intent of a remediation technology or process is to sufficiently increase the infiltration rate through the infiltrative surface at the bottom of an existing trench or bed and restore permeability to the soil below. Treatment levels as defined in Table 6-3 are not granted to remediation technologies.

    b. The Department may permit the use of remediation technologies or processes to address an existing failure or malfunction within a soil treatment area.

    c. The use of a remediation technology or process constitutes an alteration to the OWTS, and therefore the owner must obtain a minor repair permit for this work from the Department.

    d. Upon approval of the Department, a system owner may choose to try a remediation technology or process to see if an existing problem with the soil treatment area will be resolved. The system owner bears the risk and cost of this attempt and is aware that an additional repair may be required.

    e. Remediation technologies and processes must not adversely affect groundwater, surface water, any existing components, the long-term effectiveness of the soil treatment area, or the environment.

    f. If the remediation technology or process does not correct the problem with the system, a conforming OWTS must be installed per the requirements in this regulation within a time frame determined by the Department.

    g. The Department may require monitoring and/or maintenance of the remediation technology or process as a stipulation of permit issuance.

## 43.11 Design Criteria – Higher Level Treatment Systems

A. General

1. Higher level treatment systems must be designed by a professional engineer.

2. Higher level treatment systems may be public domain technology systems or proprietary systems.

    a. Public domain technology systems must be designed, installed and maintained according to established criteria and additional criteria established by the Department. When design criteria are not specifically provided in this regulation, the criteria used in the design must be from a reference commonly used as an industry standard and the criteria must be cited in the design.

    b. Proprietary systems must be designed, installed, and maintained according to manufacturer's instructions and additional criteria identified in the Technology Review and Acceptance process, section 43.13.

3. The Department will require Higher Level Treatment meeting the total nitrogen reduction requirements of treatment level TL2N per Table 6-3 in environmentally sensitive areas as defined below. Treatment level TL3N may be required if the setbacks of Table 7-2 cannot be met using TL2N.

a. Properties on which blasting has been specified by the design engineer as a means of removing unweathered competent bedrock for a proposed soil treatment area and replacing it with suitable filtration media with the intent that treated wastewater will then disperse through the fractured bedrock;

b. Properties on which the 100-foot set back from the soil treatment area and a water feature (lake, stream, or ditch) cannot be met, provided the setbacks in Table 7-2 for the selected treatment level can be maintained, and the required variance procedure outlined in Section 43.4.L of these Regulations has been approved;

c. Properties on which the 100-foot set back from the soil absorption portion of an OWTS and a well has received a variance to a lesser distance, per Section 43.4.L of these Regulations;

4. Soil treatment areas for higher level treatment systems must be pressure dosed.

5. The distribution media in Table 10-3 may be used for distribution of higher level treatment system effluent, but an additional reduction factor from Table 10-3 must not be used. Sizing reductions for higher level treatment systems are achieved through increased LTAR's provided in Table 10-1.

6. Systems must be capable of accommodating all anticipated flows and organic loads.

7. Ventilation and air systems: Mechanical components must be installed in a properly vented location and all vents, air intakes, and air hoses must be protected from snow, ice, or water vapor accumulations.

8. Covers, barriers, or other protection: All systems must be installed to include protection of openings against entry of insects, rodents, other vectors and unauthorized people.

B. The treatment levels identified in Table 6-3 are specified in this section for public domain technology, and proprietary treatment systems will be assigned a treatment level by the technology review and acceptance process in section 43.13. Adequate maintenance for each must be required and documented as in section 43.14.D.

C. Sand Filters

1. A lined or unlined intermittent sand filter, or recirculating sand filter, may be used as a higher level treatment system prior to dispersing the effluent into a soil treatment area.

2. Intermittent (Single Pass) Sand Filters; General Requirements

a. The treatment level for intermittent sand filters is considered TL3.

b. Pressure distribution is required. The design of the distribution system must also comply with the requirements of 43.10.E.3.a.

c. Sand Filter Treatment Media

(1) The depth of the sand media below the distribution system must be at least 24 inches unless otherwise noted in Table 10-1A for type "R" soils.

(2) Imported treatment sand media requirements:

(i) Effective size: 0.15-0.60 mm

(ii) Uniformity coefficient: ≤7.0

(iii) Percent fines passing #200 sieve: must be ≤ 3.0

(iv) 100% must pass the 3/8" sieve; ≥95% must pass the #4 sieve; >65% must pass the #10 sieve (2 mm).

(3) A gradation of the sand media used must be provided.

(i) The gradation report must be dated no more than four months prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.

(ii) The gradation must be provided to the department on letterhead from either the source gravel pit, or independent materials testing laboratory.

d. Gravel Requirements

(1) Clean, graded gravel, or rock, must range in size from 1/2 inch to 2 1/2 inches. AASHTO M 43 size No.3 coarse aggregate meets this specification.

(2) The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.

(3) Division accepted manufactured media may be used as an alternative to specified gravel.

e. Filter Fabric Requirements

(1) The top layer of gravel must be covered with a non-woven permeable geotextile fabric meeting a maximum thickness rating of 2.0 ounces per square yard or equivalent pervious material.

f. Final Cover Material

(1) 8 inches – 10 inches of Type 1 or 2 soil with an additional 2 inches top soil

g. Sand filters must not be used to treat wastewater that does not conform to TL1 treatment level or better.

3. Unlined (Open Bottom) Sand Filters

a. All requirements of 43.11.C.2.a-i will apply to unlined sand filters.

b. Application rates for the distribution media where a minimum of 24 inches of imported treatment sand is installed:

(1) Maximum hydraulic loading rate for tl1 effluent applied to "imported treatment sand" in an unlined sand filter is 0.8 gal./sq.ft./day

(2) Use of the long-term acceptance rate of the receiving soil for TL3 as in (1) and (2) above does not require the system comply with the operation and maintenance requirements of section 43.14, however no reductions to vertical separation distances in Table 7-2 may be taken. Size adjustment factors provided in Tables 10-2 and 10-3 are not applicable for unlined sand filters.

(3) Maximum hydraulic loading rate for TL2, TL2N, TL3, TL3N or TL3ND effluent applied to “imported treatment sand” is the soil type 1 LTAR for the treatment level of the effluent received, tl2 or tl3 (table 10-1).

c. Application rates for the in-situ soil where a minimum of 24 inches of imported treatment sand is installed:

(1) Maximum hydraulic loading rate for the in-situ soil when TL1 –TL3ND effluent is applied to the “imported treatment sand” is TL3 LTAR, (table 10-1) of the most restrictive soil within 12 inches below the sand base.

d. The upper infiltrative surface of an unlined sand filter receiving TL1 – TL2 effluent must be at least three feet above a limiting layer or groundwater conditions.

e. The upper infiltrative surface of an unlined sand filter receiving TL2-TL2N effluent must be at least two and one-half feet above a limiting layer of groundwater conditions.

f. The upper infiltrative surface of an unlined sand filter receiving TL3N or TL3N effluent must be at least two feet above a limiting layer of groundwater conditions.

g. The upper infiltrative surface of an unlined sand filter receiving TL3ND effluent must be at least one foot above a limiting layer, or groundwater condition.

h. Where adjacent sand filters are installed, the base of the excavation for each sand filter must be no closer than six feet, sidewall to sidewall.

4. Lined, single-pass sand Filters

a. All requirements for application rates provided within section 43.11.C.2.B will apply to lined sand filters.

b. The minimum depth of the sand media in a lined sand filter must be two feet.

c. An intermediate layer of pea gravel, two inches in thickness, must be placed between the sand filter media and the course under-drain media to prevent the migration of sand into the lower layer of under-drain gravel. ASTM C 33, No. 8, coarse aggregate meets this specification.

d. A minimum four-inch diameter slotted SCH40 PVC under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel, or rock ranging in size from 1/2 inch to 2 1/2 inches. AASHTO M 43, No.3 coarse aggregate meets this specification.

e. Lined sand filters must have an impervious liner on the sides and bottom of the filter. The liner must consist of a minimum 30 mil thick PVC material or equivalent.

f. Effluent collected by the under-drain must be dispersed to a soil treatment area. The soil treatment area may be sized with a maximum long-term acceptance rate of the receiving soil for TL3 effluent.

g. All requirements for application rates provided within section 43.11.C.2.B will apply to lined sand filters.

5. Lined, Recirculating Sand Filter

a. Treatment level:

(1) Treatment level provided within recirculating sand filters is TL3.

b. General Design Parameters: Not all combinations of the variables noted below will result in a proper distribution system design. The design engineer must justify through calculations or design software that the selected values will concur with industry standards.

(1) Distribution pipe size: 3/4 inch – 1.5 inches (PVC Class 200, min.)

(2) Distribution pipe spacing: 18 inches – 36 inches (24 inches typ.)

(3) Orifice size: 1/8 inch – ¼ inch

(4) Orifice spacing: 18 inches – 36 inches (24 inches typ.)

(5) A minimum 30 inch residual head at the distal end orifice for holes larger than 1/8", and a minimum 60 inch residual head for 1/8" orifices

c. Dosing:

(1) Timed dosed, pressure distribution is required. The design of the distribution system must comply with the requirements of section 43.10.E.3.a.

(2) Recirculation ratio: 3:1 – 5:1

(3) Gallons/orifice/dose: 1 – 3 (2.0 typ.)

(4) Hydraulic loading: 3 - 5 gal./sq.ft./day (4 – 5 typ.)

(5) Dosing time "ON"; <2.5 min. (<2.0 typ.)

(6) Number of cycles/day: 48 – 120

d. Top gravel requirements:

(1) Washed, graded gravel, or rock, must range in size from 1/2 inch to 2 1/2 inches. AASHTO M 43, No.3 coarse aggregate meets this specification.

(2) The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.

(3) State accepted manufactured media may be used as an alternative to specified gravel.

(4) Soil cover is prohibited. The upper gravel layer must be open to the atmosphere.

e. Filter media requirements:

(1) Effective size: 1.5 – 2.5 mm

(2) Uniformity coefficient: ≤ 3

(3) Fines passing #200 sieve: ≤ 1.0

(4) Media depth (min.): ≥24 inches

f. Intermediate gravel layer:

(1) An intermediate layer of pea gravel, two inches in thickness, must be placed between the coarse underdrain media and the sand filter media to prevent the migration of sand into the lower layer of under-drain gravel (ASTM C 33, No. 8, coarse aggregate meets this specification).

g. Under-drain requirements:

(1) A minimum four-inch diameter slotted SCH40 PVC under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel, or rock ranging in size from 1/2 inch to 2 1/2 inches. AASHTO M 43, No.3 coarse aggregate meets this specification.

h. PVC liner requirements:

(1) Lined sand filters must have an impervious liner on the sides and bottom of the filter. The liner must consist of a 30 mil thickness PVC material or equivalent.

(2) All requirements for application rates provided within section 43.11.C.2.B will apply to lined sand filters.

i. Effluent collected from the recirculating sand filter must be discharged to a soil treatment area. The soil treatment area may be sized with a maximum long-term acceptance rate of the receiving soil for TL3N effluent.

D. Mound Systems

1. When the infiltrative surface of the IMPORTED SAND media receiving wastewater effluent must be placed at or above the natural ground surface at any point to meet the vertical separation requirements of Table 7-2, it shall be considered a mound system. Mound designs can include a variety of parameters:

a. A mound installation where all of the imported sand is installed above existing grade.

b. A mound installation where the top of the imported sand is installed entirely above existing grade but the base of the imported sand is installed below existing grade.

c. A mound installation where the top of the imported sand is installed both above and below existing grade.

2. Sand fill loading rate (top of imported treatment sand)

a. For mound systems that receive tl1 effluent, and provide a minimum of 24 inches of imported treatment sand media, the LTAR for the imported treatment sand is 0.8 gal./sq/ft/day.

b. For mound systems that receive TL2, – TL3nd effluent, and provides a minimum of 24 inches of imported treatment sand media, the upper infiltrative surface of the

imported treatment sand is to be sized on the soil type 1 LTAR for the treatment level of the effluent received, as provided in table 10-1; TL2 or TL3.

c. Where tl1 effluent dispersed to the distribution media in mound systems where less than 24 inches of sand is installed, the LTAR of the imported treatment sand is the tl1 LTAR of the most restrictive soil layer within 36 inches of the upper infiltrative surface (top of imported sand).

d. Where TL2 –TL3ND effluent dispersed to the distribution media in mound systems where less than 24 inches of sand is installed, the system is to be sized on the LTAR of most restrictive soil layer within 36 inches of the upper infiltrative surface (top of imported sand), relative to the treatment level of the effluent received; tl2 or tl3. note that in order to utilize the loading rates provided by the treated effluent, the local public health agency must have adopted a program for oversight of inspection and maintenance as provided in section 43.14.d. otherwise the tl1 application rates noted in section 2.c above apply.

3. Soil loading rate (base of imported treatment sand)

a. Mound systems that provide a minimum of 24 inches of imported treatments sand treatment media may use the TL3 application rates (Table 10-1) of the most restrictive in-situ soil layer within 12 inches of the imported sand base. Use of the long-term acceptance rate of the receiving soil for TL3 does not require the system comply with the operation and maintenance requirements of section 43.14, however no reductions to vertical separation distances for use of higher level treatment in Table 7-2 may be used.Size adjustment factors within Table 10-3 must not be applied to mound designs where TL3 application rates are used. However, the adjustment factors may be applied if TL1 application rates are used.

b. A mound system may include less than 24 inches of imported treatment sand media on a site where a lesser depth of sand media is sufficient to meet vertical separation requirements above a “limiting layer” or “groundwater condition”, as specified in table 7-2. when less than 24 inches of treatment sand is imported, the following criteria apply:

(1) Where tl1 effluent is applied, tl1 application rates for the most restrictive in-situ soil layer within 36 inches of the top of the imported sand must be used. size adjustment factors within table 10-3 may be used.

(2) Where the local public health agency provides an oversight program as referenced in 43.14.D, and the effluent is treated to TL2 – TL3ND quality prior to dispersal into the distribution media, the LTAR is the soil loading rate of the most restrictive in-situ soil layer within 12 inches of the imported sand base for the treatment level of the effluent received, as provided in table 10-1;TL2 or TL3. vertical separation requirements of table 7-2 must be met, relative to the treatment level of the effluent received. size adjustment factors within table 10-3 may not be used.

(3) Where the local public health agency does not provide an oversight program as referenced in 43.14.D, and the effluent is treated to TL2 – TL3ND quality prior to dispersal into the distribution media, TL1 application rates noted in section 43.11.D.2.C above must be used.Size adjustment factors within table 10-3 may be used.

4. Linear loading rates

a. The design engineer must evaluate many factors to achieve an accurate determination of the linear loading rate. While application rates for the in-situ receiving soil under the mound is a main component, placement on the slope, and percent of slope must also be addressed when defining the linear loading rate. If the movement of the effluent is primarily vertical, then the linear loading rate is not as critical. However, if the movement of the effluent will be primarily horizontal, as would be expected in soil types 3A through 5 (Table 10-1), then the linear loading rate is extremely important and long narrow mounds are necessary.

b. When TL1 effluent is applied to the distribution media of a mound system installed above in-situ soil types WITH PERMEABILITIES LESS THAN 60 MINS/INCH 1 (Table 10-1) and R-0 through R-2 (Table 10-1A), the suggested linear loading rate is between 6 gpd/lin.ft. and 12 gpd/lin.ft. The maximum width of the distribution media in a mound system installed above these soil types is 12 feet when TL1 effluent is applied to the distribution media of a mound system.

c. When TL2-3ND effluent is applied to the distribution media of a mound system installed above in-situ soil types WITH PERMEABILITIES LESS THAN 60 MIN/INCH 1 (Table 10-1A), the linear loading rate may exceed 12 gpd/lin.ft.; subsequently the mound may be wider than 12 feet.

d. When TL1-TL3ND effluent is applied to mound systems installed above in-situ soil types with permeabilities exceeding 60 MIN/INCH (Table 10-1), the suggested linear loading rate is between 3 gpd/lin.ft. and 5 gpd/lin.ft. The maximum width of the distribution media in a mound system placed above these soil types is 12 feet, However once calculated, a lesser width may be required.

5. Mound systems must conform to the design requirements of sections 43.11.C.2 AND 3, unless otherwise specified within this section; 43.11.D.

6. The basal area must be determined using the requirements for the soil loading rate and linear loading rate provided above.

7. The final cover over a mound system must extend at least twelve inches horizontally beyond the perimeter of the distribution media prior to sloping down to existing grade. The final slope of the mound must be no greater than three feet horizontal to one foot vertical.

8. On sites with slopes in excess of 25 percent a retaining structure and liner may be used on the downhill side. The liner must be placed three feet from the edge of the chambers or gravel and a minimum of 12 inches into existing native grade. Trenches or narrow beds installed parallel with the native contour of the slope must be used to limit the height of the infiltrative surface above grade.

9. The surface of the mounded area must be planted with a suitable vegetative cover; preventing erosion and promoting run-off.

10. The Colorado Department of Public Health and Environment, Water Quality division has created a technical guidance document for Mounded Wastewater Treatment Systems that should be referenced when designing this type of system. Another suggested reference for the design and installation of mound systems is, “The Wisconsin Mound Soil Absorption System: Siting, Design, and Construction Manual, January 2000”.

E. Rock Plant Filter (Constructed Wetland) Treatment Before a Soil Treatment Area

1. A rock plant filter system must be designed by a professional engineer.

2. The design must be site specific and include specifications for: loading, capacity, dimensions, liner material, filter media, effluent depth and depth control mechanism, density and species of plant material, and other site specific information.

3. The treated effluent from a rock plant filter must be distributed to a soil treatment area.

4. Although producing higher level treatment, rock plant filters must not be assigned a treatment level higher than TL1 because of system and seasonal variability.

## 43.12 Design Criteria – Non-Pressurized Drip Dispersal System (NDDS), Evapotranspiration, and Limited Use Systems

A. Evapotranspiration and Evapotranspiration/Absorption Systems:

1. Non-Pressurized Drip Dispersal System (NDDS):

a. An NDDS is considered a type of evapotranspiration/absorption system. However, as specific design criteria is provided for an NDDS, they are exempt from the additional requirements of section 43.12.A.2, 3 and 4.

b. New NDDS installations are prohibited.

2. The following section provides general criteria which must be followed when an evapotranspiration or evapotranspiration/absorption bed is proposed.

a. The design may only be permitted in arid climates where the annual evaporation rate exceeds the annual precipitation rate by more than 20 percent, and where site characteristics dictate that conventional methods of effluent dispersal are not appropriate.

b. The design may only be permitted in soil types 4, 4A and 5

c. The system must be designed by a professional engineer.

d. If data for the Pan Evaporation Rate is provided, it must be multiplied by 0.70, or less, to obtain the equivalent Lake Evaporation Rate.

e. The width of the bed may be wider than 12 feet.

f. The required capillary or wicking sand must meet the gradation requirements in Table 12-1 and be approved by the design engineer.

(1) The gradation of the wicking sand must be submitted to the local public health agency on letterhead from either the source gravel pit, or independent materials testing laboratory. The gradation must be dated not more than one month prior to the installation date.

g. This sand is to be covered by a crowned, thin layer of loamy-sand mix and appropriate vegetation that will assist in drawing the water to the surface.

h. Adjustment factors as provided in Tables 10-2 and 10-3 must not be used.

3. For systems designed strictly as an evapotranspiration bed, the following criteria must be met:

a. Design data to be furnished must include, but shall not be limited to; system dimensions, distribution system design, specifications of distribution media and wicking sand, liner material if used, bedding, properties of the soil under the system, vegetation cover, and a water balance calculation including annual precipitation and storage requirements for periods of the year when evapotranspiration does not occur.

b. The following formula must be used for determining the minimum area necessary for total evapotranspiration of septic tank effluent:

$$\text{Area (in square feet)}^* = \frac{\text{Design Flow (in gallons per day)} \times 586}{\text{Lake Evaporation Rate at the Site (in inches per year)}}$$

* Additional area may be required based on the annual water balance calculations.

c. Designs will include a rock and pipe, or other Division approved proprietary distribution product, with the centerline of the distribution system laterals no more than feet on center and within 3 feet of the sidewall or endwall. A thin non-woven fabric may be placed above the distribution system. Capillary wicking of the effluent is accomplished by a uniform depth layer of the specified sand media (capillary wicks), no more than 24 inches deep, placed between and above the distribution media. The base of the evapotranspiration bed may be no more than 30 inches below finished grade.

d. Capillary wicks which penetrate between the distribution system to the bottom of the bed must be at least 15 percent of the bed surface area. The wicks must be uniformly spaced throughout the system.

e. Except for dwellings, if the system is designed for summer use only, as determined by the Department, the surface area may be multiplied by 0.6 to obtain the required area.

4. For systems designed as an evapotranspiration/absorption bed, the following criteria must be met:

a. Data to be furnished must include, but is not limited to: system dimensions, distribution system design, specifications of wicking sand, properties of the soil under the evapotranspiration/absorption bed, provision for vegetation cover, and a water balance calculation including annual precipitation and storage requirements for periods of the year when evapotranspiration does not occur.

b. Design will include a rock and pipe, or other Division approved proprietary distribution product, with the centerline of the distribution system laterals 6- feet on center. A thin non-woven fabric as defined within section 43.10.G.1.C may be placed above the distribution media. Capillary wicking of the effluent is accomplished by a uniform depth layer of the specified sand media (capillary wicks) no more than 24 inches deep placed between and above the distribution media. The infiltrative surface may be no more than 30 inches below finished grade.

c. Capillary wicks which penetrate between the distribution system to the bottom of the bed, must be at least 15 percent of the bed surface area. The wicks must be uniformly spaced throughout the bed.

d. Amount of storage and evapotranspiration capacities may be reduced by the volume of effluent absorbed by the underlying soil based on the long-term acceptance rate for that soil type and the formulas provided in section 43.12.A.4.e below.

e. The following formula must be used for determining the minimum area necessary for evapotranspiration/absorption of septic tank effluent:

(1) $$\text{Area (sq. ft.)}^* = \frac{\text{Flow (gpd)}}{(\text{LTAR} + \text{ETR})}$$

(i) LTAR refers to the long-term acceptance rate of the underlying soil as provided in Table 10-1 for TL1 effluent.

(ii) ETR refers to the evapotranspiration rate derived from the following formula:

$$\text{ETR (gal./day sq. ft.)} = \frac{\text{Lake Evaporation Rate at the Site (in inches per year)}}{586}$$

* Additional area may be required based on the annual water balance calculations.

B. Seepage Pits

1. The construction of new seepage pits for the treatment and dispersal of on-site wastewater on new sites is prohibited.

C. Limited Use Wastewater Systems

1. Use of these systems is intended to provide an option for wastewater disposal when a standard OWTS with a soil treatment area is impractical due to site conditions, limited access, and where soil treatment areas are prohibited. Due to the high cost of maintenance associated with limited use systems, financial reasons or seasonal use alone cannot be considered as a justification for a limited use wastewater system.

2. Vaults and Vaulted Privies

a. Vaults for use in new construction of single family dwellings or commercial facilities are prohibited when the property can accommodate an OWTS with a soil treatment area, except as provided in (1) – (3) below:

(1) The Department may approve the use of a vault or vaulted privy for new construction of a dwelling built as a Cabin, as defined in Larimer County Land Use Code and per Larimer County Building Department policy, when water under pressure is not provided, or the source of water is hauled or hand carried to the site.

(i) If the use of the dwelling is later changed from a Cabin to a Single Family Dwelling or the source of water changes to a public supply or private well, a full system with a soil treatment area meeting requirements of Section 43.10 may be required.

(2) A vault may be permitted if the property is located in an area where the installation of an OWTS with soil treatment area is not permitted.

(3) Vault or vaulted privy permits may be granted for specialized commercial uses, or when a connection to public sewer is pending and written documentation approving the connection from the wastewater supplier or district having authority is provided.

b. A vault must have a minimum 1250 gallon effective volume or be capable of holding a minimum of the two-day 48-hour design wastewater flow, whichever is larger.

c. Vaults may be permitted for repairs when a failing OWTS cannot be replaced.

d. Building permits to expand the use of a property currently served by a vault will be approved only if the vault is capable of holding a minimum of the 48-hour design wastewater flow.

e. A visual or an audible signal device or both, indicating filling to a maximum of 75 percent capacity, must be installed to indicate when pumping is necessary.

(1) For properties that will be used as a short term rental, a signaling device with both an audible and visual alarm is required.

f. Vaults may be permitted for systems where some of the wastewater flows are separated, such as toilet wastes only, into a vault. The portion not retained in the vault must be
treated in an adequately-sized OWTS with a soil treatment area sized per the requirements of this regulation.

g. a vault must be accessible for routine pumping and maintenance.

h. concrete, fiberglass, and plastic tanks are allowed for use as a vault. All tanks must meet the structural design requirements of section 43.9.B.5 or 6, as applicable.

i. vaults must be watertight, and meet the requirements of section 43.8.D and 43.9.A.1.A.

j. Metal vaults are prohibited.

3. Vaulted and Pit Privies

a. Vaulted privies for use in new construction of single family dwellings or commercial facilities are prohibited when the property can accommodate an OWTS with a soil treatment area.

b. Concrete vaults must meet the strength and watertightness requirements for septic tanks. Prefabricated fiberglass, fiberglass-reinforced polyester, and plastic tanks may be used as vaults, if the tank manufacturer provides testing criteria certifying them for this use.

c. Effective volume of the vault portion of a vaulted privy must be no less than 400 gallons and it must be constructed of pre-cast concrete or approved plastic. The vaults for privies must meet the structural and water tightness requirements of septic tanks. Site built concrete or concrete masonry unit tanks are not approved.

d. A vault privy structure must be built to include: fly- and rodent-tight construction, a superstructure affording complete privacy, an earth mound around the top of the vault and below floor level that slopes downward away from the superstructure base, a floor, and a riser of concrete or other impervious material with hinged seats and covers of easily cleanable, impervious material. All venting must be fly-proofed with No. 16 or tighter mesh screening.

e. On properties where there is no other option for an OWTS with a soil treatment area, or other limited use system as provided in section 43.12.B, and no vehicle access exists

to the property for maintenance of a tank or vault, a pit privy may be considered by this Department and must meet the following requirements:

(1) The bottom of the pit must be located above at least four feet of suitable soil and four feet above a limiting layer;

(2) The pit must have at least 400 gallons of effective volume; and

(3) The superstructure must provide complete privacy and have fly- and rodent-tight construction, an earth mound around the top of the pit and below floor level that slopes downward away from the superstructure base, a floor, and a riser of concrete or other impervious material with hinged seats and covers of easily cleanable, impervious material. All venting must be fly-proofed with No. 16 or tighter mesh screening.

f. Installation of new or continued use of existing pit privies where an OWTS with a soil treatment area or another limited use wastewater system can be installed is prohibited.

4. Incinerating and Composting Toilets

a. The use of an incinerating or composting toilet will not reduce the required size of the OWTS as noted in section 43.8.A. This type of installation may also be subject to the jurisdiction of a local agency regulating plumbing or the Colorado Plumbing Board, whichever has jurisdiction over plumbing in the location.

b. An incinerating or composting toilet may be used for toilet waste where an OWTS or limited use system is installed for treating wastewater remaining after removal of toilet waste. Subject to other applicable regulations or codes, the composting or incinerating toilet may be located within a dwelling, or separate building provided the unit complies with the applicable requirements of this regulation, and provided the installation will not result in conditions considered to be a health hazard as determined by the local public health agency. Compartment and appurtenances related to the unit must include fly-tight and vector-proof construction and exterior ventilation.

c. Incinerating toilets must be designed and installed in accordance with all applicable federal, state, and local air-pollution requirements and manufacturer's instructions.

d. Composting Toilets must meet the requirements of NSF/ANSI Standard 41 and bear the seal of approval of the NSF or an equivalent testing and certification program and meet the following requirements;

(1) An approved composting toilet must treat deposits of feces, urine, and readily decomposable household garbage that are not diluted with water or other fluids and are retained in a compartment in which aerobic composting will occur.

(2) The effective volume of the receptacle must be sufficient to accommodate the number of persons served in the design of the unit installed. The effective volume of the unit must include sufficient area for the use of composting materials which must not be toxic to the process or hazardous to persons and which must be used in sufficient quantity to assure proper decomposition.

(3) Residue from the composting toilet must be removed when it is filled to 75 percent of capacity. Residue from the unit must be properly disposed of by

methods recommended by the manufacturer and acceptable to the local public health agency. Disposal methods must prevent contamination of water and not cause a public health nuisance. Disposal using solid waste practices is recommended.

(4) If a system will be installed where low temperature may be a factor, design and installation must address the effects of the low temperature. Composting toilets are not permitted for full time use in unheated dwellings or structures unless a standard flush toilet is also available.

(5) Composting toilets must be operated according to manufacturer's specifications.

(6) Overflow, drainage lines, or liquid separation tanks from composting toilets must be plumbed to an approved OWTS.

(7) Composting toilets are not approved for use at temporary or special events.

e. Incinerating toilets must meet the requirements of the NSF Protocol P157 and bear the seal of approval of the NSF or an equivalent testing and certification program, and must be operated according to manufacturer's specifications.

5. Portable Chemical Toilets

a. Use of a portable chemical toilet for permanently occupied buildings is prohibited except during construction or under emergency circumstances as determined by the Department.

b. Portable chemical toilets or other temporary facilities are not approved as a means of disposing of wastewater from sites that operate as event centers or as community halls per Larimer County Land Use Code.

c. Portable toilets may be used for temporary and special events per the Larimer County Land Use Code. Use of an OWTS or limited use wastewater system for a special or temporary event must be in compliance with this Regulation and be appropriately sized per section 43.6.

6. Slit Trenches

a. Construction of new or continued use of existing slit trenches is prohibited.

D. Treatment Systems Other Than Those Discharging Through a Soil Treatment Area or Sand Filter System

1. For systems discharging to State Waters, see section 2.C.

2. Systems that discharge other than through a soil treatment area or a sand filter system must:

a. Be designed by a professional engineer;

b. Be reviewed by the Board of Health; and

c. Not pose a potential health hazard or private or public nuisance or undue risk of contamination.

d. Not allow drainage of effluent off of the property of origin.

e. For residential systems, not utilize spray or drip irrigation directly to the ground surface.

3. The following minimum performance criteria must be required for all permitted systems pursuant to this section:

a. If effluent discharge is made into areas in which the possibility exists for occasional direct human contact with the effluent discharge, the effluent at the point of discharge must meet the minimum treatment criteria of TL3 effluent and specifically adhere to each of the following standards:

(1) The geometric mean of the *E. coli* density must not exceed 15 per 100 milliliters when averaged over any five consecutive samples, and no single sample result for *E. coli* can exceed 126 per 100 milliliters.

(2) The arithmetic mean of the standard five-day carbonaceous biochemical oxygen demand ($CBOD_5$) must not exceed ten milligrams per liter when averaged over any three consecutive samples.

(3) The arithmetic mean of the total suspended solids must not exceed ten milligrams per liter when averaged over any three consecutive samples.

b. If the effluent discharge is made into an area so restricted as to protect against the likelihood of direct human contact with the discharged effluent, the effluent at the point of discharge must meet the treatment criteria of TL2 effluent and specifically adhere to each of the following standards:

(1) The geometric mean of the *E. coli* density must not exceed 126 per 100 milliliters when averaged over any five consecutive samples, and no single sample can exceed 325 *E. coli* per 100 milliliters.

(2) The arithmetic mean of the standard five-day carbonaceous biochemical oxygen demand ($CBOD_5$) must not exceed 25 milligrams per liter when averaged over any three consecutive samples.

(3) The arithmetic mean of the total suspended solids must not exceed 30 milligrams per liter when averaged over any three consecutive samples.

4. To determine compliance with the standards contained in this section, the required sampling frequency for *E. coli*, $CBOD_5$, and total suspended solid levels must be performed at least once per month when the system is in operation and the results submitted to the Department for compliance with the permit requirements.

5. Methods of Analysis - Sampling Points:

a. All effluent samples must be analyzed according to the methods prescribed in the American Public Health Association, American Water Works Association, and Water Environment Federation: Standards Methods for the Examination of Water and Wastewater, 21st edition.

b. The sampling point must be a location that is representative of final discharge from the system.

E. Disinfection systems

1. Disinfection components must meet the requirements of nsf/ansi standard 385 (version 2022), or prior acceptance through nsf/ansi standard 46 – version 2022 or earlier, and bear the seal of approval of the nsf or an equivalent testing program. this component may be installed between the higher level treatment system and the pump tank, or within the pump tank.

    a. All methods of disinfection shall effectively reduce the fecal coliform count to ≤200 organisms per 100 ml.

    b. If chlorination is used as the disinfection method, a free chlorine residual of two tenths of a milligram per liter (0.2 mg/l) must be maintained in the pump tank.

    c. The use of disinfection systems is only allowed provided the effluent is treated to TL3N quality prior to entering the disinfection system, and
    the local public health agency has implemented an inspection and maintenance oversight program, as specified in the requirements of section 43.14.D.

### 43.13 Technology Review and Acceptance

A. OWTS technologies must either be public domain, including but not limited to rock and pipe distribution systems, sand filters with pressure distribution and mound systems, with criteria for design, installation, maintenance and use as described in this regulation, or proprietary products that have received Division review and acceptance before the Department may permit them for use.

B. The Division must review and provide either comment or acceptance to the manufacturer for proprietary products in these technology categories:

1. Proprietary treatment products (e.g. treatment systems);

2. Propriety distribution products (e.g. manufactured distribution products or subsurface dripline);

3. Septic tanks;

4. Others as needed.

C. Product Acceptance Requirements – General:

1. To qualify for product acceptance, manufacturers desiring to sell or distribute proprietary products in Colorado must submit a completed application to the Division in the format provided by the Division and a report describing in detail the test procedures and data confirming the performance and properties of the product claimed by the manufacturer. Products within a single series or model line sharing distinct similarities in design, materials, capacities, configuration, and claiming the same level of treatment may be accepted under a single application. Products outside
of the series or model line must be accepted under separate applications. The following information must be included in the application:

    a. Manufacturer’s name, mailing address, street address, and phone number;

    b. Contact individual’s name, mailing address, street address, phone number and email address. The contact individual must be vested with the authority to represent the manufacturer in the acceptance process;

    c. Category of product (e.g., proprietary treatment product, proprietary distribution product, and treatment level requested, septic tank);

d. Name, including specific brand and model, of the proprietary product;

e. A description of the functions of the proprietary product, along with any known limitations on the use of the product;

f. Product description and technical information, including dimensioned drawings; materials and characteristics; component design specifications; and volumes, design capacity, and flow assumptions and calculations, as relevant;

g. Siting and installation requirements;

h. Product performance information in appropriate product section;

i. Detailed description, procedure and schedule of routine service and maintenance events;

j. Copies of manufacturer's literature to include sales and promotion, design, installation, operation and maintenance, and owner instructions; and

k. Identification of information subject to protection from disclosure and trade secrets, if any.

2. Upon receipt of an application, the Division must verify that the application is complete and meets the requirements for which the product is being evaluated. If the application is found to be complete, and the requirements of this section needed to accept the product are met, the Division will place the product on a list of accepted proprietary products for the type of product. Installation and use of accepted products must comply with the requirements noted on the acceptance document provided by the Division.

3. Manufacturers must have readily accessible and up to date information for designers, regulators, product owners, and other interested parties about their product including:

a. Product manuals;

b. Design instructions;

c. Installation instructions;

d. Operation and maintenance instructions; and

e. A list of representatives and manufacturer-certified service providers in Colorado, if any. If none exist, information on how service on the product will be provided in Colorado.

4. If, at any time after a proprietary product has been accepted for use, the Division receives information that the product so accepted does not meet the required standards, or in any way constitutes a public health or environmental hazard, the Division may, at its discretion, revoke the product acceptance. The Division shall notify the manufacturer and local public health agencies within 30 days of any revocation.

D. Proprietary Treatment Product Acceptance Requirements

1. If a proprietary treatment product is submitted to meet a specific treatment level, a report with test procedures and data must be submitted to the Division to demonstrate that it can meet the treatment level for which the approval is being requested on a consistent basis in actual installations. The Division must approve the test methods and programs. Test results from product certification testing must also be submitted.

2. If a product is accepted for a specific treatment level, the product may also be used for applications requiring lower treatment levels. Reductions based on higher level treatment may not be applied unless the Department has a maintenance oversight program in place as described in section 43.14.D.

3. Field Performance Testing

   a. Testing must be performed by a neutral third party.

   b. Testing for residential applications must be performed on a minimum of 12 single-family homes under normal operating conditions unless otherwise noted below:

      (1) If the proprietary treatment product is requesting TL2 acceptance and that product has received NSF/ANSI 40 certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 40 certification must be submitted if the reduced number of test sites is requested.

      (2) If the proprietary treatment product is requesting TL2N OR TL3N acceptance and that product has received NSF/ANSI 245 certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 245 certification must be submitted if the reduced number of test sites is requested.

   c. Each system must be tested over a period of at least one year.

   d. Each system must be sampled at least four times during the year with the sampling evenly distributed throughout the year.

   e. Laboratory results for all parameters for which acceptance is being requested must be submitted.

   f. Testing may be performed in Colorado under a Product Development Permit.

   g. Testing may be performed in locations other than Colorado. As part of the testing, the manufacturer must define, to the acceptance of the Division, what adjustments or modifications to the product will be required to compensate for the following conditions:

      (1) Increased elevation results in lower atmospheric pressure and lower oxygen content. Adjustments or modifications to the treatment process may be
      required to compensate for these conditions and those adjustments or modifications must be specified.

      (2) Winter season conditions in Colorado include cold temperatures that may affect product performance. Adjustments or modifications to the treatment process may be required to compensate for these conditions and those adjustments or modifications must be specified. This item must be addressed if nitrogen reductions are claimed.

   h. The report conclusions must indicate the proprietary treatment unit can consistently be expected to meet the treatment level for which acceptance is being requested.

   i. The report must include estimated operating costs for the first five years of the treatment system’s life. This must include both estimated annual electricity or other

energy costs, and routine inspection and maintenance costs, including replacement of parts.

(1) Energy and other costs are to be based on typical Denver, Colorado, costs at the time of the acceptance request.

(2) Replacement part costs must include shipping and handling.

(3) If media or other major part replacement is expected during the normal life of the system, the cost of replacement and the typical replacement interval must be included even if replacement is not expected within five years.

4. The manufacturer must identify the provisions that they have developed for the training of installers and service providers specific to their product line.

5. Following the adoption of regulation 43 in 2013, that regulation provided limited provisions for the continued acceptance of treatment level 2 proprietary products that had been previously accepted for use in colorado prior to june 30, 2013, under nsf/ansi 40 (2013 or earlier version) or equivalent testing. only treatment products with a CDPHE acceptance letter dated after june 30, 2013 will be accepted for use in colorado

E. Proprietary Distribution Product Acceptance Requirements

1. Proprietary manufactured distribution products must:

a. Be constructed or manufactured from materials that are non-decaying and non-deteriorating and do not leach chemicals when exposed to septic tank effluent and the subsurface soil environment;

b. For gravity distribution systems, the product must provide a liquid storage volume at least equal to the storage volume within the assumed 30 percent void space in a rock and pipe distribution system assuming six inches of rock below the pipe and two inches above the pipe;

c. Maintain the integrity of the trench or bed. The material used, by its nature and its manufacturer-prescribed installation procedures, must withstand the physical forces of the soil sidewalls, soil backfill and the weight of equipment used in the backfilling; and

d. If the width of a proprietary manufactured distribution product is within 90 percent of the width of the excavation, it may be approved as being equivalent to the full width of the excavation, if information is provided that demonstrates distribution over the full
width. Thus, the product must cover at least 90 percent of the excavated area in either a trench or bed configuration in order to receive sizing adjustments provided in Table 10-3.

2. Chambers:

a. Include a sidewall that is structurally sound and capable of allowing aeration of the infiltrative surface and exfiltration of effluent while minimizing the intrusion of soil.

b. Chambers construction shall meet IAPMO property standards, PS 63 (2019 version).

3. Enhanced manufactured media:

a. The product must include synthetic media contained within one or more external permeable outer layers that promote the movement of the effluent and prevent the intrusion of soil from above the synthetic media. Manufacturer must demonstrate that the product has been adequately tested and functions as intended.

b. For enhanced manufactured media that requires a specified layer of sand or other media to be placed below the actual product, the vertical separation requirements of this regulation will be determined from the base of the sand or other media, as the sand or media is an integral part of the component.

c. For products that allow for sand extensions beyond the actual manufactured component, the distance of sand allowed from the edge of the excavation to the manufactured component may be up to six inches in a trench system and 24 inches in a bed system.

d. If sand media is proposed by the manufacturer as an integral part of the distribution product, it must meet the size and uniformity specifications as noted by the manufacturer.

4. Other manufactured media:

a. In order to receive sizing adjustments provided in Table 10-3, the product must cover at least 90 percent of the excavated area in either a trench or bed configuration without the use of gravel, stone or other aggregate containing fines, which may compromise soil permeability.

5. Proprietary subsurface dripline products must:

a. Be warranted by the manufacturer for use with OWTS effluent;

b. Specify required treatment level of influent to the driplines;

c. Be designed for resistance to root intrusion; and

d. Incorporate emitters that may be controlled either by use of pressure-compensation emitters or with a pressure regulator.

F. Septic Tank Acceptance Requirements

1. Septic tank design must conform to the requirements of section 43.9.B. of this regulation.

2. Each manufacturer must annually test five percent of its tanks for watertightness at the manufacturing facility, unless the tanks are certified for use as a septic tank by the International Association of Plumbing and Mechanical Officials (IAPMO) or Canadian Standards Association(CSA), or the manufacturer participates in the Plant Certification Program of the National Precast Concrete Association (NPCA).

3. Watertightness results must be sent to the Division on an annual basis unless otherwise addressed in section 43.13.F.2 above. The manufacturer must provide information that specifies measures taken to repair a tank that fails the watertightness test. The manufacturer must also define the measures taken to prevent similar problems in future tanks.

4. IAPMO, CSA, and NPCA certifications must be submitted to the Division for acceptance. Current certifications must be submitted to the Division on an annual basis.

G. Other Product Acceptance Requirements

1. The Division may adopt review and acceptance requirements for additional products as needed.

### 43.14 Operation and Maintenance

A. Responsibility: The owner must be responsible for maintenance of an OWTS unless the responsibility has been contractually assigned to a tenant or a third party or a public, quasi-public, or political subdivision.

B. Service Label: For higher level treatment systems or other components under a service contract, a clearly visible, permanently attached label or plate giving instructions for obtaining service must be placed at a conspicuous location.

C. The Board of Health may adopt regulations for:

1. Scheduling of maintenance and cleaning;

2. Practices adequate to ensure performance of an OWTS; and/or

3. Submission of proof of maintenance and cleaning to the Department by the owner of the system.

D. Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher Level Treatment;

1. Reductions in requirements for soil treatment areas, vertical separation distances to limiting layers or reductions in horizontal separation distances by using higher level treatment systems are based on the criteria that these systems are functioning as designed. If these criteria are not met, failure or malfunction is likely, which could result in impairment to public health and water quality.

2. Prior to issuing a permit for systems with a reduced soil treatment area, vertical separation distances to limiting layers, or reductions in horizontal separation distances as a result of higher level treatment, OR INSTALLATION OF A DISINFECTION COMPONENT, the applicant must complete a Higher Level Treatment System Maintenance Agreement, acknowledging the requirements associated with installation of the system per section 43.14.D.3.LICENSING OF MAINTENANCE PROVIDERS MAY BE INCLUDED IN THIS PROGRAM.

3. In addition, the Department will keep the following records for each Higher Level Treatment System permitted;

a. Records that indicate:

(1) Owner and contact information;

(2) Address and legal description of property;

(3) Location of OWTS specifying location of septic tank, higher level treatment system, soil treatment area and other components;

(4) Description of OWTS installed;

(5) Level of treatment to be provided;

(6) Copy of current contract with a service provider;

(7) Inspection and maintenance performed:

(i) Dates system was inspected and/or maintained;

(ii) Name and contact information of inspector and/or maintenance provider;

(iii) Condition of system at inspection; and

(iv) Maintenance tasks performed;

(8) Permits, if required by the Department for the work performed; and

(9) Condition of system at completion of any maintenance activity.

b. require system of inspection and maintenance on a schedule being the most frequent of:

(1) Manufacturer recommendations for proprietary systems or design criteria requirements for public domain technology;

(2) Department or Division requirements;

(3) For higher level treatment systems and disinfection systems, two inspections at six-month intervals for the first year of operation, followed by annual inspections for the life of the system.

4. Owner responsibilities:

a. Ensure OWTS is operating, maintained and performing according to the required standards for the designated treatment level;

b. Maintain an active service contract with a maintenance provider at all times; and

c. Each time his/her current contract with a maintenance provider is renewed or replaced, send a copy to the Department within 30 days of signing.

5. Maintenance provider responsibilities:

a. Must notify the Department when a service contract has been terminated.

b. Must obtain appropriate training/certification for specific proprietary treatment products as provided by the manufacturer necessary to provide the required operation and maintenance for said products.

E. Monitoring and Sampling

1. Sampling may be required by the Department in conjunction with an enforcement action or to ensure compliance with the provisions of this regulation, as provided in section E.3 below.

a. Sampling and analysis must be performed according to american public health association, american water works association, and water environment federation: standards methods for the examination of water and wastewater, 24nd edition, 2022 (INTERNATIONAL STANDARD BOOK NUMBER: ISBN-10: 0875532993, ISBN-13: 978-0875532998)

1. Any owner or occupant of property on which an OWTS is located may request the Department to collect and test an effluent sample from the system. The Department may perform such collection and testing services. The owner or occupant must pay for these services.

    a. If the Department or a delegated third party collects and tests effluent samples, a fee not to exceed that which is allowed by the OWTS Act may be charged for each sample collected and tested. Payment of such charge must be stated in the permit as a condition for its continued use.

2. Conditions that provide for a Department to require routine water quality monitoring include:

    a. Indications of inadequate performance;

    b. Location in sensitive areas;

    c. Systems designed to meet TL3ND standards

    d. treatment systems other than those discharging through a soil treatment area or sand filter system (43.12.G);

    e. Remediation systems and/or

    f. Systems under use permits (43.4.M), or product development permits (43.4.I).

### 43.15 Severability

The provisions of this regulation are severable, and if any provisions or the application of the provisions to any circumstances are held invalid, the application of such provision to other circumstances, and the remainder of this regulation will not be affected thereby.

### 43.16 Materials Incorporated by Reference

Throughout these regulations, standards and requirements by outside organizations have been adopted and incorporated by reference. The materials incorporated by reference cited herein include only those versions that were in effect as of March 10, 2024 and not later amendments to the incorporated material.

Materials incorporated by reference are available for public inspection during normal business hours from the Water Quality Control Division, 4300 Cherry Creek Drive South, Denver, Colorado 80246. Copies may be purchased from the source organizations listed below.

AASHTO, American Association of State Highway and Transportation Officials
444 North Capitol Street, NW, Suite 249
Washington, DC 20001
Phone: 202-624-5800
Email: info@aashto.org
www.transportation.org

ANSI, American National Standards
Institute 25 West 43rd Street, 4th floor
New York, NY 10036
Phone: 212.642.4900
www.ansi.org

ASTM, American Society for Testing and Materials
ASTM International
100 Barr Harbor
Drive PO Box C700
West Conshohocken, PA 19428-2959
Phone: 610.832.9500
Email: service@astm.org www.astm.org
CSA, Canadian Standards Association
CSA Group Testing and Certification Inc.
178 Rexdale Boulevard
Toronto, Ontario M9W
1R3 Canada
Phone: 800-463-6727
Email: sales@csagroup.org
www.csagroup.org

ETL, Electrical Testing Laboratories
The ETL Listed Mark is from Intertek Testing Services NA, Inc. (ITSNA)
545 East Algonquin Road, Suite F
Arlington Heights, Illinois 60005
Phone: 800 967 5352
www.intertek.com

IAPMO, International Association of Plumbing and Mechanical Officials
International Association of Plumbing and Mechanical Officials EGS (IAPMO)
4755 East Philadelphia Street
Ontario, CA 91761
Phone: 909-472-4100
Email: iapmo@iapmo.org
www.iapmo.org

NPCA, National Precast Concrete Association
1320 City Center Drive, Suite 200
Carmel, IN 46032
Phone: 800-366-7731
www.precast.org

NSF, National Sanitation Foundation
NSF International (NSF)
789 North Dixboro Road
Ann Arbor, Michigan
48105
Phone: 734-769-8010
Email: info@nsf.org
www.nsf.org

UL Underwriters Laboratories
Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, Illinois 60062
Phone: 847.272.8800
Email: CustomerExperienceCenter@ul.com
www.ul.com

Standard Methods for the Examination of Water and Wastewater, 21st edition.

A joint publication of the American Public Health Association, American Water Works Association, and Water Environment Federation
Phone: 877-574-1233
Email: standardmethods@wef.org
www.standardmethods.org/Buy/

43.17 – 43.21 **Reserved**

**Table 5-1 Rupture Resistance: Blocks, Peds, Clods – Estimate the Class by the force required to rupture (break) a soil unit.**

| Dry Cementation Class | Specimen Falls Under |
|---|---|
| Loose | Intact specimen not obtainable |
| Non-Cemented | Very slight force between fingers |
| Extremely Weakly Cemented | Slight force between fingers |
| Very Weakly Cemented | Moderate force between fingers |
| Weakly Cemented | Strong force between fingers |
| Moderately Cemented | Moderate force between hand |
| Strongly Cemented | Foot pressure by full body weight |
| Very Strongly Cemented | Blow of > 4.5 lbs., but not body weight |
| Indurated | Blow of ≥ 4.5 lbs. weight dropped at 6 inches |

Source: NRCS Field Book for Describing and Sampling Soils, Version 3.0; 2021 Reprint; Consistence section, pg. 2-63. Dry Rupture Resistance applies to soils that are moderately dry or drier.

**Table 6-1 Single-Family Residential Design Flows**

| # Bedrooms | Occupancy (# of Persons) | Wastewater Flow Per Person (gallons/day) | Design Flow (gallons/day) |
|---|---|---|---|
| 2 | 4 | 75 | 300 |
| 3 | 6 | 75 | 450 |
| 4 | 7 | 75 | 525 |
| 5 | 8 | 75 | 600 |
| 6 | 9 | 75 | 675 |

**TABLE 6-2 For Design Purposes, the Estimated Daily Wastewater Flow and BOD 5 Load Per Person Unless Otherwise Noted in Section 43.6.A.4**

| RESIDENTIAL WASTEWATER | GPPD | BOD 5 IN POUNDS PER DAY |
|---|---|---|
| Single-family dwellings | 75 | .20 |
| Auxiliary buildings, by fixture type | | |

| | | |
|---|---|---|
| Bath/Shower | 14.7 | .014 |
| Dishwasher | 1.8 | .002 |
| Kitchen sink with garbage grinder | 5.8 | .052 |
| Laundry washer | 19.5 | .037 |
| Lavatory | 8.4 | .021 |
| Water closet (toilet) | 24.8 | .029 |
| Tiny Homes[3], per unit | 150 | .40 |
| One Bedroom Accessory Dwelling Units | 150 | .40 |

| RESIDENTIAL, OTHER | GPD | BOD 5 IN POUNDS PER DAY |
|---|---|---|
| Hotels and motels per room | 75 | .15 |
| Multiple-family dwellings or apartments per occupant | 75 | .20 |
| Boarding and rooming houses per room (users absent during working hours) | 50 | .15 |
| Mobile home per occupant | 75 | .20 |
| Mobile home park per space | 300 | .80 |
| TINY HOMES[3], PER UNIT | 150 | .40 |
| Vacation home rental; per additional bed space provided; in addition to the 150 gal./bedroom[4] | 50 | .20 |

| COMMERCIAL WASTEWATER | GPD | BOD 5 IN POUNDS PER DAY |
|---|---|---|
| DAY-USE, OR TRANSIENT FACILITIES | | |
| Facilities with short-term or transient visitors. Airports or bus stations per passenger; fairgrounds per person attending; ball parks, race tracks, stadiums, theaters or auditoriums per seat | 5 | .02 |
| Airport per employee | 10 | .06 |
| Barber and beauty shops per chair | 100 | .70[1] |
| Bowling alleys per lane - toilet wastes only | 5 | .03[1] |

| | | |
|---|---|---|
| Country club per member | 30 | .02 |
| County club per employee | 20 | .06 |
| Dentist offices per non-wet chair | 50 | .14[1] |
| Doctor offices per doctor | 250 | .80[1] |
| Event centers/wedding venues/banquet hall, per seat; without any food service | 5.0 | .01 |
| Event centers/wedding venues/banquet hall, per seat; with food and/or drink preparation | 7.5 | .01 |
| Farm workers, factories and plants, exclusive of industrial wastewater, per employee per eight-hour shift – no showers | 20 | .05 |
| Farm workers, factories and plants exclusive of industrial wastewater per employee per eight-hour shift - showers provided | 20 | .08 |
| Laundries, self-service per commercial washer | 400 | .75 |
| Office buildings per employee per eight-hour shift | 15 | .06 |
| Service stations per toilet fixture | 250 | .50[1] |
| Stores and shopping centers per square foot of retail space | .1 | .01[1] |
| Work or construction camps semi-permanent with flush toilets | 50 | .17 |
| Work or construction camps semi-permanent without flush toilets | 35 | .02 |

| FOOD SERVICE ESTABLISHMENTS | GPD | BOD 5 IN POUNDS PER DAY |
|---|---|---|
| Restaurant open 1 or 2 meals per seat | 50 | .06/meal |
| COFFEE SHOP PER CUSTOMER | 3.5 | .50[1, 8] |
| 24-hour restaurant per seat | 75 | .07/meal served |
| Restaurant with paper service only per seat | 25 | .01/meal served |
| Additional for bars and cocktail lounges per seat | 30 | .02 |
| Drive-in restaurant per car space | 50 | .02 |

| INSTITUTIONAL WASTEWATER WITHOUT KITCHENS UNLESS OTHERWISE NOTED | GPD | BOD 5 IN POUNDS PER DAY |
|---|---|---|
| Churches per seat; without any food service, or other uses | 3.5 | .01 |
| Churches, per seat; warming kitchen only, no major food service | 5 | .01 |
| Churches, per seat; with food service, per meal served[4] | 7.5 | .02 |
| Hospitals per bed space | 250 | .20 |
| Nursing homes; Group homes for developmentally disabled, per bed space | 125 | .20 |
| Schools, Boarding per person | 100 | .17 |
| Schools, Day without cafeteria, gym or showers | 15 | .04 |
| Schools, Day with cafeterias, no gym or showers | 20 | .08 |
| Schools, Day with cafeterias, gym and showers | 25 | .10 |
| Schools, Day additional for school workers | 15 | .06 |
| **RECREATIONAL AND SEASONAL WASTEWATER USE** | **GPD** | **BOD 5 IN POUNDS PER DAY** |
| Camps, day, no meals served | 15 | .12 |
| Camps, primitive (limited plumbing) | 25 | .12 |
| Camps, residential | 50 | .12 |
| Luxury resort | 125 | .17 |
| Resort night and day/Guest Ranches | 50 | .12 |
| Campground per campsite[2] | 50 | .12 |
| Public park flush toilet per fixture per hour when park is open | 36 | .04 lbs./ fixture |
| Public park urinal per fixture per hour when park is open | 10 | .01 lbs./fixture |
| Public park shower per fixture per hour when park is open | 100 | .10 lbs./ fixture |
| Public park faucet per fixture per hour when park is open | 15 | .04 lbs./ fixture |

| | | |
|---|---|---|
| Swimming pools and bathhouses | 10 | .06 |
| Travel trailer parks with individual water and sewage hookup per unit [2] | 100 | .24 |
| Travel trailer park without individual water and sewage hookup per unit [2] | 50 | .12 |

1 BOD levels need further verification depending on the specific use of the facility.
2 Laundry facilities are to be calculated on a per commercial washer basis in accordance with other elements of this table.
3 For the purposes of this Table, a "Tiny home" is a structure that has only one bedroom and has <400 sq.ft. of livable space, including lofts.
4 For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine projected design flows.

**Table 6-3 Treatment Levels**

| Treatment Level | $BOD_5$ (mg/L) | $CBOD_5$ [1] (mg/L) | TSS (mg/L) | Total Nitrogen (mg/L) |
|---|---|---|---|---|
| TL1[2] | 180 | - | 80 | 60-80 |
| TL2 | - | 25 | 30 | N/A[3] |
| TL2N | - | 25 | 30 | >50% reduction[4] |
| TL3 | - | 10 | 10 | N/A[3] |
| TL3N | - | 10 | 10 | 20 mg/L |

Shading indicates higher treatment levels.
1 Requirements for $CBOD_5$ are only related to effluent samples from a higher level treatment system.
2 Domestic septic tank effluent prior to soil treatment or higher level treatment has a wide range of concentrations. These values are typical, but values used for design must account for site-specific information.
3 Total Nitrogen does not apply to Treatment Levels TL2 and TL3. Processes intended to reduce total nitrogen are addressed in Treatment Levels TL2N and TL3N. Any total nitrogen reductions that may be observed for TL2 and TL3 are as a result of the treatment process for $BOD_5$ and TSS reductions.
4 NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction requires reduction of 50 percent rather than an absolute value.

**Table 6-4 High Strength Wastewater***

| | $BOD_5$ (mg/L) | TSS (mg/L) | Fats, Oils, Grease (FOG) (mg/L) |
|---|---|---|---|
| Septic Tank Influent | >300 | >200 | >50 |
| Septic Tank Effluent | >180 | >80 | >25 |

* High strength effluent prior to a septic tank has a wide range of concentrations. These values are typical, but values used for design purposes must account for site-specific information

## Table 7-1 Minimum Horizontal Distances in Feet Between Components of an On-Site Wastewater Treatment System Installed After November 15, 1973 and Water, Physical and Health Impact Features

| | Spring, Well[1], Suction Line, Potable Water Supply Cistern[4] | Potable Water Supply Line, Geothermal Coils | Structure w/Basement, Crawl Space, or Footing Drains | Structure Without Basement, Crawl Space, or Footing Drains | Property Lines[11], ~~Piped or Lined Irrigation Ditch~~, or Upslope Curtain Drain | Subsurface drain, intermittent agricultural irrigation lateral, lined pond, or irrigation channel, drywell, storm sewer, stormwater structure or conveyance | Surface water, lake, river, open irrigation channel, stream, wetland | Dry Gulch, Cut Bank, Fill Area (From Crest) | Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault, Vaulted Privy |
|---|---|---|---|---|---|---|---|---|---|
| SEPTIC TANK, HIGHER LEVEL TREATMENT UNIT, DOSING TANK, EFFLEUNT PIPE[2], VAULT, OR VAULT PRIVY | 50[2] | 10[2] | 5 | 5 | 10 | 10 | 50 | 10 | -- |
| Building Sewer | 50[2] | 5[6] | 0 | 0 | 10[2] | 10[2] | 50[2] | 10[2] | -- |
| STA Trench, STA Bed, Unlined Sand Filter, Subsurface Dispersal System, Seepage Pit, Pit Privy | 100[3] | 25[2] | 20 | 10 | 10 | 25 | 100[3] | 25 | 5 |
| Lined Sand Filter | 60 | 10[2] | 15 | 10 | 10 | 10 | 50 | 10 | 5 |
| Lined Evapotranspiration Field or Outside of Berm of Lined Wastewater Pond | 60 | 10[2] | 15 | 15 | 10 | 10 | 50 | 10 | 5 |
| Open unlined or partially lined evapotranspiration system, outside of berm of unlined wastewater pond, or system not relying on sta for treatment other than aerosol | 100 | 25[2] | 20 | 15 | 10 | 25 | 100 | 15 | 10 |
| System Not Relying on STA for Dispersal | 100[3] | 10[2] | 125[5] | 125[5] | 10 | -- | 50[3] | 10 | 10 |

NOTE: The minimum distances shown above must be maintained between the OWTS components and the features described. Where soil, geological or other conditions warrant, greater distances may be required by the local board of health or by the Water Quality Control Commission pursuant to section 25-8-206, C.R.S. and applicable regulations. For repair or upgrading of existing OWTS where the size of lot precludes adherence to these distances, a repaired OWTS must not be closer to setback features than the existing OWTS, as reviewed and approved by the local public health agency.

1. Includes potable wells, irrigation wells and monitoring wells set within a potable aquifer and infiltration galleries permitted as wells by the Division of Water Resources. All horizontal setbacks to a potable water supply must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2, (Division of Water Resources). Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted for new construction through a variance is to 75 feet; and must meet the requirements of Table 7-2 of this regulation. Setbacks for existing wells must comply with requirements of section 43.10.I.2.

2. Crossings or encroachments may be permitted at the points as noted above provided that the potable water or wastewater conveyance pipe is encased for the minimum setback distance on each side of the crossing. A length of pipe with a minimum Schedule 40 rating [ASTM Standard D3034-24 (2024 version)] of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating [ASTM Standard D3034-24 (2024 version)] must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe must be drilled in the lowest section of the rigid cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the end caps must be sealed with an approved underground sealant compatible with the piping used. Piping of equal or higher strength may also be used. Other methods of separation between the potable water pipe and a

component of the OWTS that provide equal protection are allowed. These may include, but are not limited to, concrete or controlled flowable fill encasement extending no less than 10 feet each side of the crossing, or an impermeable geo-membrane curtain extending at least two feet below the potable water pipe and no less than 10 feet each side of the crossing. These methods must be reviewed and approved by the local public health agency.

3. Add eight feet additional distance for each 100 gallons per day of design flows between 1,000 and 2,000 gallons per day, unless it can be demonstrated by a professional engineer or geologist by a hydrologic analysis or the use of a barrier, consisting of a minimum 30 mil PVC liner or equivalent, that contamination will be minimized. If effluent meets Treatment Level 3N and the local public health agency has a maintenance oversight program in accordance with section 14.D. of this regulation, the distance addition is not required. Flows greater than 2,000 gallons per day must be hydrologically analyzed for flow, velocity, hydraulic head, and other pertinent characteristics as means of estimating distances required to minimize contamination as part of the Division site application and permitting process.

4. All horizontal setbacks to an underground potable water supply cistern must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2. Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted through a variance is to 25 feet. Noted setbacks are not required to above ground cisterns.

5. If the structure is not used as a habitable unit, the isolation may be reduced by the local board of health to no less than 50 feet.

6. Building sewer installations shall meet the design requirements of the Colorado Plumbing Code.

7. Where ditch companies have a specific right of easement for "reasonable and necessary use to access, operate, and maintain ditches", all OWTS components must maintain a minimum of 25' setback from the crest of the ditch/channel.

8. Sites with multiple OWTS on a single property where the total flows are > 2,000 gpd must meet the increased required setbacks as provided in WQSA-6 (Policy 6).

9. Per 2 CCR 402-10 (6.4.2) Geothermal wells shall be located at least 100 feet to the nearest source or potential source of contamination, unless a variance has been obtained from the state engineer.

10. Setback from a utility easement: While a specific setback for components of an OWTS to a utility easement is not specifically identified, the intent of the regulation is provided herein. The setback from utility easements is dependent on whether the utility is above or below ground. For above ground utilities, components of an OWTS must not be installed in areas where construction or maintenance vehicles may be required to travel in order to gain access to the utility. For utilities installed below grade, the objective is to setback the utility far enough away from the soil treatment area so that sewage will not seep into a utility trench excavation. The setback is also necessary to prevent construction or maintenance vehicles from driving on any component of an OWTS. Where remote properties have a blanket utility easement, the owner/operator of the OWTS will be responsible for providing signage or physical barriers as needed to reduce the risk of vehicular traffic or other disturbance to the OWTS. In all instances, a five foot setback will typically address most concerns.

11. In specific circumstances, the local public health agency may allow for a reduced setback from a property line to the OWTS; per the requirements of section 43.7.D.1.

## Table 7-2 MINIMUM SEPARATION DISTANCE REQUIREMENTS IN FEET FROM SOIL TREATMENT AREA, RELATIVE TO TREATMENT LEVEL PROVIDED[3]

| ITEM | OWTS DESIGN CONSIDERATION | Treatment Levels 1 and 2 | Treatment Level 2N* | Treatment Level 3* | Treatment Level 3N* | Treatment Level 3ND* |
|---|---|---|---|---|---|---|
| | Horizontal Separation Distances | | | | | |
| 1 | Distance from soil treatment area to on-site well | Greater than or equal to 100 feet | Greater than or equal to 100 feet | Greater than or equal to 100 feet | Greater than or equal to 100 feet [1] | Greater than or equal to 100 feet [1] |
| 2 | Distance from soil treatment area to pond, creek, lake, or other surface water feature | Greater than or equal to 100 feet | Greater than or equal to 50 feet | Greater than or equal to 50 feet | Greater than or equal to 25 feet | Greater than or equal to 25 feet |
| 3 | Distance from soil treatment area to dry gulch or cut bank | Greater than or equal to 25 feet | Greater than or equal to 10 feet | Greater than or equal to 10 feet | Greater than or equal to 10 feet | Greater than or equal to 10 feet |
| | Vertical Separation Distances | | | | | |
| 4 | Treatment depth in feet from infiltrative surface to a limiting layer | 4 feet[2] (3 feet with pressure dosing) | Greater than or equal to 2.5 feet | Greater than or equal to 2.5 feet | Greater than or equal to 2 feet | Greater than or equal to 1 feet |
| 4B | Treatment depth in feet from infiltrative surface to a limiting layer, or groundwater condition with the inclusion of an unlined sand filter | 3 (TL1)<br>2.5 (TL2) | 2.5 | 2 | 2 | 1 |

*Requires pressure distribution

NOTE: Treatment levels are defined in Table 6-3. Reductions in separation distances with higher level treatment may be granted only if the Department regulations have included provisions for operation and maintenance.

1 All setback distance reductions to the 100 foot requirement for wells and soil treatment areas must be in full compliance with the minimum standards and variance requirements of the State of Colorado Division of Water Resources: Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction. For TL 3N effluent, a reduction to 75 feet is allowed if a variance from the Water Well Construction Regulations is obtained.

2 Reductions in the vertical separation requirements for the use of higher level treatment systems with seepage pits are not allowed. The bottom of the excavation of a seepage pit must be a minimum of four feet above a limiting layer.

Table 9-1 Minimum Septic Tank Size Based on Number of Bedrooms

| Number of Bedrooms | Tank Capacity (gallons) |
|---|---|
| 2 or 3 | 1,000 |
| 4 | 1,250 |
| Each Additional | 250 |

**Table 10-1 Soil Treatment Area Long-term Acceptance Rates by Soil Texture, Soil Structure, Percolation Rate and Treatment Level**

| Soil Type, Texture, Structure and Percolation Rate Range | | | | | Long-term Acceptance Rate (LTAR); Gallons per day per square foot[2] | | | |
|---|---|---|---|---|---|---|---|---|
| **Soil Type** | **USDA Soil Texture** | **USDA Soil Structure-Type** | **USDA Soil Structure-Grade** | **Percolation Rate (MPI)** | **Treatment Level 1[1]** | **Treatment Level 2 and 2N[1]** | **Treatment Level 2N[1]** | **Treatment Level 3, 3N and 3ND1*** |
| | | | | | | | | |
| **R** | **>35% Rock (>2mm), or Fractured or Deteriorated Bedrock: See Table 10-1A** | | | | | **>35% Rock (>2mm), or Fractured or Deteriorated Bedrock: See Table 10-1A** | | |
| 1 | Sand, Loamy Sand | Single Grain | 0 (Structureless) | 5-15 | 0.80 | **1.40** | **1.40** | **1.55** |
| 2 | Sandy Loam, Loam, Silt Loam | PR (Prismatic) BK (Blocky) GR (Granular) | 2 (Moderate) 3 (Strong) | 16-25 | 0.60 | **1.0** | **1.0** | **1.1** |
| 2A | Sandy Loam, Loam, Silt Loam | PR, BK, GR<br>Massive | 1 (Weak)<br>0 (Structureless) | 26-40 | 0.50 | **0.80** | **0.80** | **0.90** |
| 3 | ıy Loam, Clay Loam, Silty Clay Loam | PR, BK, GR | 2, 3 | 41-60 | 0.35 | **0.55** | **0.55** | **0.65** |
| **3A** | **y Loam, Clay Loam, Silty Clay Loam** | **PR, BK, GR**<br>**Massive** | **1**<br>**0 (Structureless)** | **61-75** | **0.30** | **0.45** | **0.45** | **0.55** |
| **4** | **Sandy Clay, Clay, Silty Clay** | **PR, BK, GR** | **2, 3** | **76-90** | **0.20** | **0.30** | **0.30** | **0.30** |
| **4A[3]** | **Sandy Clay, Clay, Silty Clay** | **PR, BK, GR**<br>**Massive** | **1**<br>**0 (Structureless)** | **91-120** | **0.15** | **0.20** | **0.20** | **0.20** |
| **5[3]** | **Soil Types 2-4A** | **Platy** | **1, 2, 3** | **121+** | **0.10** | **0.15** | **0.15** | **0.15** |

**NOTE: Shaded areas require system design by a professional engineer.**

1. Treatment levels are defined in Table 6-3.
2. The determination of long-term acceptance rates must also include an evaluation of soil consistence (identification of “cementation class”). Refer to the Rupture Resistance chart, Table 5-1, in section 43.5.D. Moderately to Very strongly cemented soils will typically have characteristics of Type 3A or 4A soils. Long term acceptance rates should be reduced to coincide with the expected permeabilities.
3. Soil types 4A and 5 will require the effluent to be dispersed via pressure distribution, with a minimum of two alternately dosed zones.

* Higher long-term acceptance rates for Treatment Level 3N may be allowed for OWTS required to have a discharge permit, if the capability of the design to achieve a higher long-term acceptance rate can be substantiated.

## Table 10-1A Design Criteria for Soils with High Rock Content (Type "R" Soils) [1,2,3,4]

| Soil Matrix Type, Percent of Rock, Size of Rock, Excavation Difficulty, and Soil Permeability[3] | | | | Required sand depth relative to the quality of effluent applied to the distribution cell[7] | | | |
|---|---|---|---|---|---|---|---|
| Soil Type[3] | Soil Matrix Type, Percent of Rock, and Size of Rock[3,4] | Excavation Difficulty | Soil Permeability; Minutes Per Inch (MPI)[1, 2] | Treatment Level 1[7, 8] | Treatment Level 2 and 2N[7] | Treatment Level 3 and 3N[7] | Treatment Level 3ND[7] |
| FBR | In-situ<br>Fractured Bedrock (FBR) | Low<br>Moderate<br>High<br>Very High<br>Extremely High | 0 – >90<br>Usually rapid in highly fractured bedrock. | Minimum 3-foot deep Unlined Sand Filter | Minimum 2.5-foot deep Unlined Sand Filter | Minimum 2-foot deep Unlined Sand Filter | Minimum 1-foot deep Unlined Sand Filter |
| DBR | In-situ<br>Deteriorated Bedrock (DBR | Low<br>Moderate<br>High | 41 – >90<br>Typically slower than the material textures | Minimum 2-foot deep Unlined Sand Filter | Minimum 1-foot deep Unlined Sand Filter | Sand media not required | Sand media not required |
| R-0 | Soil Type[3] 1 (Sand and Loamy Sand) where more than 35% rock is greater than 2 mm in size. | Low- Tile spade with arm pressure. | 0 to 15 | Minimum 3-foot deep Unlined Sand Filter | Minimum 2.5-foot deep Unlined Sand Filter | Minimum 2-foot deep Unlined Sand Filter | Minimum 1-foot deep Unlined Sand Filter |
| R-1 | Soil Type[3] 2 – 4, with 35 - 65% rock (>2mm); where 50% or more of the rock is less than 20 mm (3/4 inch) in size | Low - Tile spade with arm pressure, To, Moderate - Tile spade with foot pressure. | 16 to 90 Varies relative to soil type and cementation class. | Minimum 2-foot deep Unlined Sand Filter | Minimum 1-foot deep Unlined Sand Filter | Sand media not required | Sand media not required |
| R-2 | Soil Type[3] 2 – 4, with more than 65 Rock (>2mm); OR contains 35 - 65% rock (>2mm), where 50% or more of rock is more than 20 mm (3/4 inch) | Low - Tile spade with arm pressure, To, Moderate - Tile spade with foot pressure. | 16 to 90 Varies relative to soil type and cementation class. | Minimum 3-foot deep Unlined Sand Filter | Minimum 2.5-foot deep Unlined Sand Filter | Minimum 2-foot deep Unlined Sand Filter | Minimum 1-foot deep Unlined Sand Filter |
| R-3 | Soil Type[3] 2 – 4 (Loam, Clay Loam, Clay) with 65% or more of the rock is greater than >2mm OR, Soil Type3 4A and 5 (Structureless Clay, or other Platy Structured Soil) with more than 35% rock | High – Tile spade is difficult, pick using over-thehead swing is easy. Very High – Pick with over-thehead swing is moderate to markedly difficult. Extremely High – Pick with over-the-head swing is nearly impossible. | Greater than 90 Soil Type[3] 2 – 4 (Loam, Clay Loam, Clay) More than 65% of the Rock is greater than 2mm in size. OR, 50% or more of Rock is greater than 20 mm (3/4 inch) in size. | Minimum 3-foot deep Unlined Sand Filter | Minimum 2.5-foot deep Unlined Sand Filter | Minimum 2-foot deep Unlined Sand Filter | Minimum 1-foot deep Unlined Sand Filter |

1) General guidance for Table 10-1A:

a) FBR: Fractured Bedrock – As this category encompasses a variety of site conditions where the percentage of rock, excavation difficulty, and permeability may vary substantially, all information must be used by the design engineer to determine the proper long term acceptance rate. Table 10-1B provides guidance for this determination.

b) DBR: Deteriorated Bedrock – As this category encompasses a variety of site conditions where the percentage of rock, excavation difficulty, and permeability may vary substantially, all information must be used by the design engineer to determine the proper long term acceptance rate. Table 10-1C provides criteria for this determination.

c) Soil Type R-0 is a limiting layer due to rapid permeability and a high rock content that provides limited surface area for adequate treatment.

d) Soil Type R-2 and R-3 are restrictive layers due to reduced permeability and/or a high rock content, each providing a limited surface area for adequate treatment. In many cases, the only difference between an R-2 and R-3 soil type will be the "excavation difficulty" and/or soil permeability.

e) An OWTS installed in "Type R Soils" must disperse effluent through an unlined sand filter, unless one of the following conditions are met:

i) Treatment Level 3ND is attained and the requirements of 43.12.F are met.

ii) Site conditions are determined to be a soil Type DBR, or R-1, and Treatment Level 3 or 3N effluent is attained prior to dispersal to the soil treatment area.

f) "Excavation Difficulty" is provided in Table 10-1C

2) Provisions for determining the long-term acceptance rates for soils referenced in this chart are provided in section 43.11.C.3. The design of systems in type "R" soils must conform to the requirements of sections 43.11.C.2 and 3.

3) The "Soil Matrix Type, Percentage and Size of Rock" column references the soil types described in Table 10-1.

4) The percentage of rock may be determined by a gradation conducted per ASTM standard D6913-17 (2017. version), or a visual determination as per pgs. 7-1 through 7-9 of the NRCS Field Book, Version 3, 2021 reprint.

5) All systems installed in a type "R" soil must be designed by a professional engineer.

6) Pressure distribution is required for all "R" Soil Types and shall comply with the requirements of sections 43.10.E.3.
7) Minimum imported sand depths are provided in this table. NOTE HOWEVER THAT AN ADDITIONAL VERTICAL SEPARATION ABOVE A LIMITING LAYER OR GROUNDWATER CONDITION MAY BE NECESSARY TO MEET THE REQUIREMENTS OF TABLE 7-2.
8) Type "R" soil treatment systems that are designed per the criteria noted in the Treatment Level 1 column of this table do not require operation and maintenance oversight by the local public health agency.

**Table 10-2 Size Adjustment Factors for Methods of Application in Soil Treatment Areas Accepting Treatment Levels 1, 2, 2N, 3 and 3N Effluent**

| Type of Soil Treatment Area | Method of Effluent Application from Treatment Unit Preceding Soil Treatment Area | | |
|---|---|---|---|
| | Gravity | Dosed to Gravity (Siphon or Pump) | Pressure Distribution (Siphon or Pump) |
| Bed | 1.2 | 1.1 | 1.0 |
| Trench | 1.0 | 0.9 | 0.8 |

**Table 10-3 Size Adjustment Factors for Types of Distribution Media in Soil Treatment Areas for Treatment Level 1 Systems**

| Type of Soil Treatment Area | Type of Distribution Media Used in Soil Treatment Area[1] | | |
|---|---|---|---|
| | Category 1 | Category 2 | Category 3 |
| | Rock or Tire Chips | Other Manufactured Media | Chambers or Enhanced Manufactured Media |
| Trench or Bed; Soil Types 1-4 | 1.0 | 0.9 | 0.7 |
| Trench or Bed; Soil Types 4A - 5 | 1.2 | 1.1 | 1.0 |

1. All proprietary distribution products must receive acceptance and the applicable reduction through Division review per the applicable requirements of section 43.13.

**Table 12-1 Gradation of Wicking Sand for Evapotranspiration Beds (Fine Sand)**

| Sieve Size | Percent Passing |
|---|---|
| 4 | 100 |
| 40 | 50-70 |
| 200 | <15 |